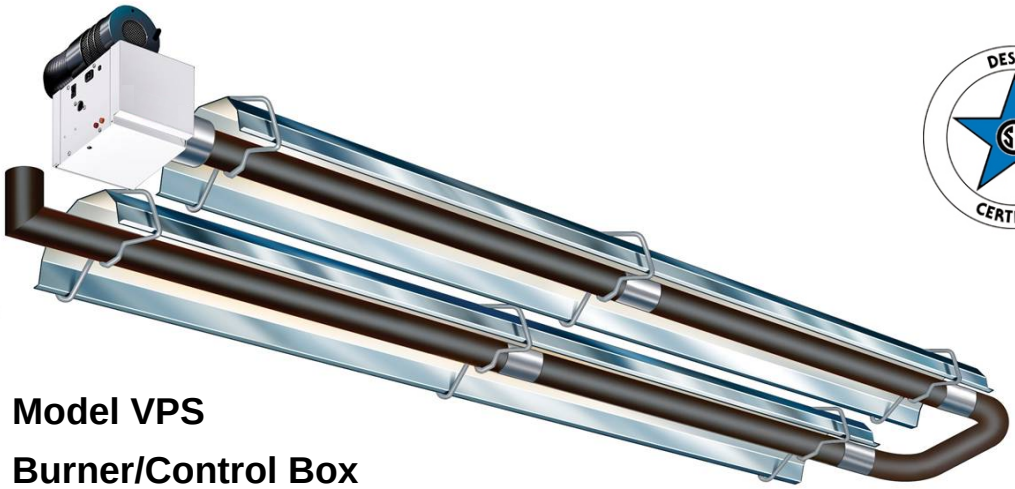
Form I-VPS (Version B)

INSTALLATION / OPERATION / MAINTENANCE

Applies to: **Model VPS 120V 60Hz**
Gas-Fired, Tubular, Radiant,
Low-Intensity Infrared Heater



Model VPS
Burner/Control Box
with 20 - 80 ft Tube/Reflector Length

FOR YOUR SAFETY
If you smell gas: 1. Open windows. 2. Don't touch electrical switches. 3. Extinguish any open flame. 4. Immediately call your gas supplier.

FOR YOUR SAFETY
The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

WARNING: Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury or death. Read the installation, operation, and maintenance instructions thoroughly before installing or servicing this equipment.

WARNING: Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapors or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons, or in applications with airborne silicone substances.

Part No. 270683

Introduction.

Welcome to the new range of powered infra-red heaters. Local regulations may vary and it is the installer's responsibility to ensure that such regulations are satisfied.

All installation, assembly, commissioning and service procedures must be carried out by suitable qualified competent persons and conform with local building codes, or in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA 54 or the National Gas and Propane Installation Code CSA B149.1

When assembling, installing, commissioning and servicing is undertaken on radiant tube heaters specified in these instructions, due care and attention is required to ensure that working at height regulations are adhered to.

***PLEASE READ** this document prior to installation to familiarize yourself with the components and tools you require at the various stages of assembly.*

All Dimensions shown are in inches unless otherwise stated.

The manufacturer reserves the right to alter specifications without prior notice.

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1. Installation Requirements.

1.1 Health and Safety

A. Heater is intended for heating non-residential indoor spaces and should only be installed where flammable gases or vapors are not generally present.

B. Heaters may be suspended either horizontal or at any angle. See section 1.3 for clearance dimensions.

C. The installation must conform with local building codes or, in the absence of local codes, with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1.*

D. The unit shall be electrically grounded in accordance with National Electric Code ANSI/NFPA 70 and Canadian Electrical Code CSA C22.1.

E. The heater may be installed in aircraft hangars in accordance with the Standard for *Aircraft Hangars, ANSI/NFPA 409* and in automotive garages when

installed in accordance with the Standard for *Parking Structures, ANSI/NFPA 88A*, or the Standard for *Repair Garages, ANSI/NFPA 88B*, or the *Canadian Natural Gas and Propane Installation Code, CSA B149.1*, and are so marked. Ensure that minimum clearances will be maintained to vehicles parked below the heater.

F. The standard heaters are approved for installations between 0 - 2000ft (0 - 610m) for the US and 0 - 4500 ft (1370m) for Canada. Conversion kits are available on installations above these heights in the USA.

Note: Any outdoor installations must be installed with a vent cap at the inlet and the flue end.

1.2 Heater Suspension

Attachment to the heater support lugs should be made by D shackle. The hanging attachments to overhead steelwork etc. must be purpose made to sound engineering practice or supplied by others.

They must be adequately fixed and designed to carry the whole weight of the heater. In the event of suitable roof steelwork being unavailable, additional steelwork should be fitted to enable vertical hangers to be used for suspending the heaters.

These methods are illustrated in Figure 1. If there are any doubts as to the strength or suitability of roof steelwork to which heaters are to be suspended, please refer to a Consultant, Architect or owner of the building.

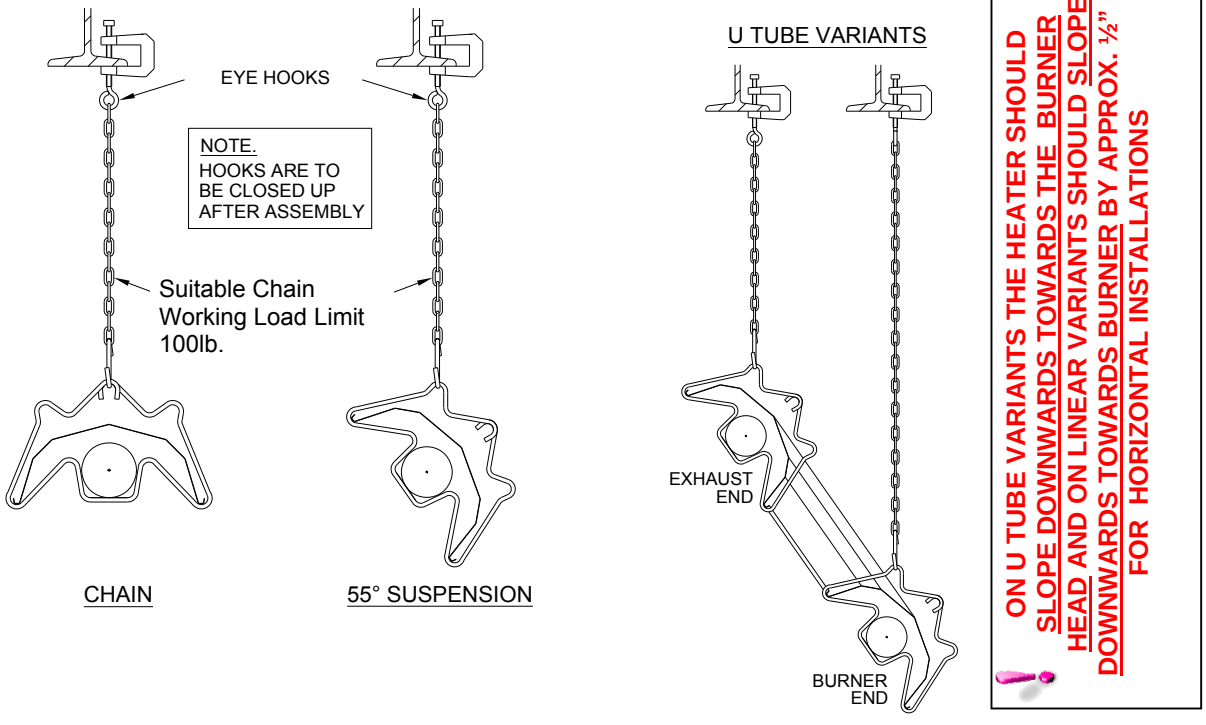
It is recommended that the heater is raised to its final position once the assembly of the tube/ bracket/reflector has been completed. Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air.

The suggested mounting heights for heaters are given in the chart next page.

WARNING:

If not installed, operated and maintained in accordance with the manufacturer's instructions, this product could expose you to substances in fuel or from fuel combustion which are known to the state of California to cause cancer, birth defects or other reproductive harm.

Figure 1. Recommended Methods of Heater Suspension.


EYE HOOKS
NOTE.
HOOKS ARE TO BE CLOSED UP AFTER ASSEMBLY
Suitable Chain Working Load Limit 100lb.
CHAIN
55° SUSPENSION
U TUBE VARIANTS
EXHAUST END
BURNER END
ON U TUBE VARIANTS THE HEATER SHOULD SLOPE DOWNWARDS TOWARDS THE BURNER HEAD AND ON LINEAR VARIANTS SHOULD SLOPE DOWNWARDS TOWARDS BURNER BY APPROX. ½" FOR HORIZONTAL INSTALLATIONS

1.3 Clearance to Combustibles.

Minimum clearance to combustibles are shown in Figure 2. Refer to table 1 below.

IMPORTANT:

The stated clearance to combustibles represents a surface temperature of 90°F (50°C) above room temperature.

Building material with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures.

It is the installer's responsibility to assure that adjacent materials are protected from degradation.

Table 1	**Clearance to Combustibles, inches (cm)**								
Burner Rating	**A**	**B**	**B1**	**C1**	**C2**	**C3**	**D1**	**D2**	**E**
60	74 (188)	29 (74)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	12 (31)	12 (31)
80	74 (188)	29 (74)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	12 (31)	12 (31)
100	74 (188)	32 (82)	41 (105)	20 (51) / 10* (26)*	8 (21)	22 (56)	8 (21)	16 (41)	12 (31)
125	74 (188)	39 (99)	47 (120)	20 (51) / 10* (26)*	8 (21)	22 (56)	20 (51)	18 (46)	12 (31)
150	74 (188)	39 (99)	48 (122)	20 (51) / 10* (26)*	8 (21)	22 (56)	20 (51)	18 (46)	12 (31)
170	86 (219)	48 (122)	48 (122)	20 (51) / 10* (26)*	11 (28)	22 (56)	20 (51)	20 (51)	12 (31)
200	86 (219)	48 (122)	48 (122)	20 (51) / 10* (26)*	11 (28)	22 (56)	20 (51)	20 (51)	12 (31)

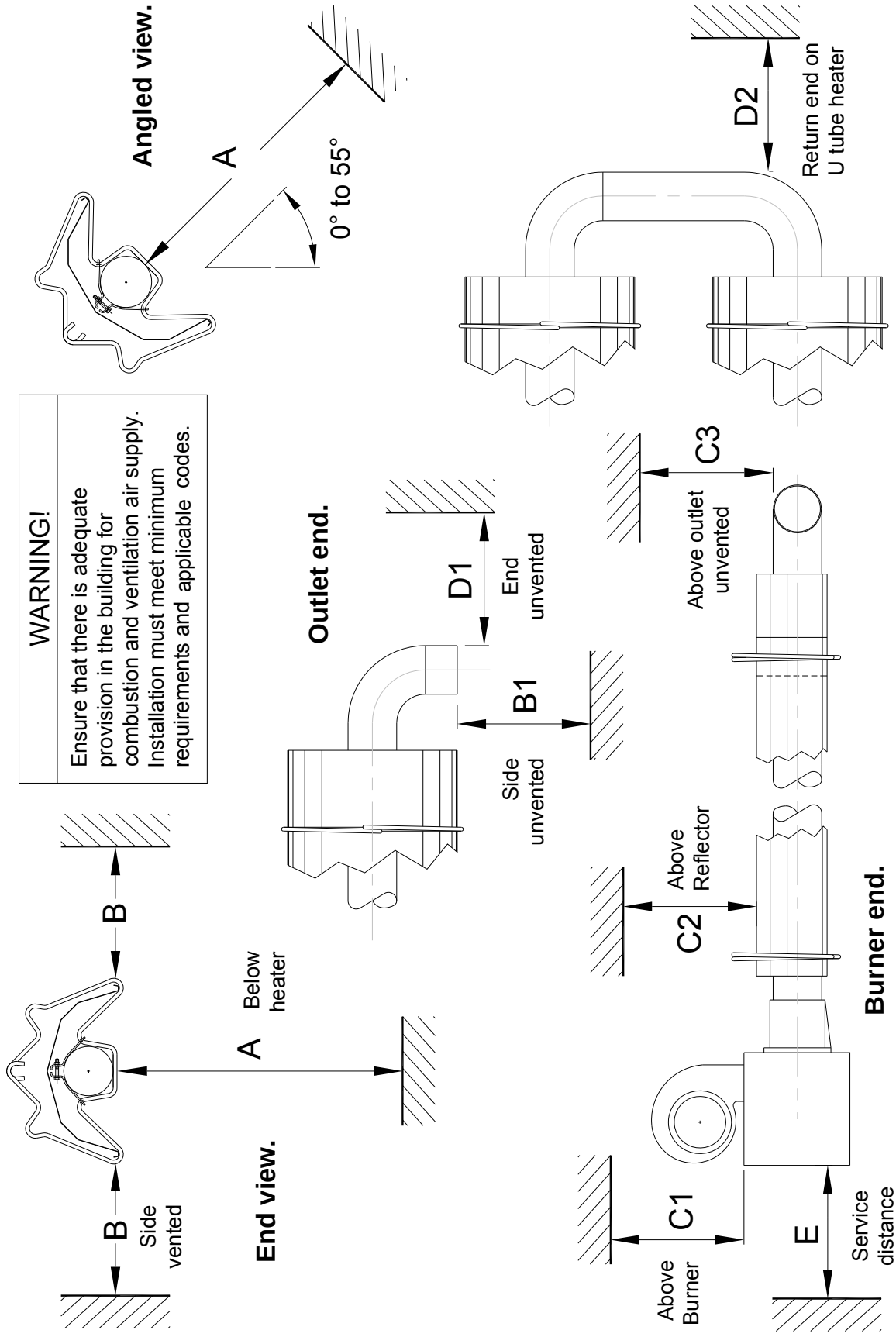
** distance with end caps fitted.*

WARNING:

Minimum clearance from the heater must be maintained from vehicles parked below heater. In all situations, clearances to combustibles must be maintained. Signs should be posted in storage areas to specify maximum stacking height to maintain required clearance to combustibles. Such signs must either be posted adjacent to the heater thermostats or in the absence of such thermostats in a conspicuous location.
Refer to mounting clearance tables.

Figure 2 Clearance to Combustibles.

The minimum clearances to combustible materials are given in the tables below. These minimum distances MUST be adhered to at all times. Adequate clearance MUST be provided around air openings into the combustion chamber and there MUST be suitable clearance for accessibility and for combustion / ventilating air supplies.



1.4 Gas Connection and Supply

WARNING: Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

The gas connection on the heater is ½" N.P.T internal thread.

Injector sizes and manifold pressure for the burners are shown in the table 4. The gas supply piping and connections must be installed so that the minimum pressure stated is achieved.

A gas shut off valve and union should be fitted in the gas supply line close to the heater and a ⅛" N.P.T plugged tapping, accessible for test gauge connection, provided immediately upstream of the appliance gas inlet.

It is essential to provide some flexibility in the final gas connection by use of an approved flexible gas connector. See Fig 4.

Take care when making a gas connection to the heater not to apply excessive turning force to the internal controls.

Care must be taken to observe the minimum pipe bend diameter (minimum 10" - 250mm, maximum 14" - 350mm) & pipe expansion distance (minimum 1⅛" - 28mm, maximum 3¾") - 95mm.

The correct installation as shown will allow for approx 4" of movement due to expansion.

Figure 3. Correct orientation of Ball Valve

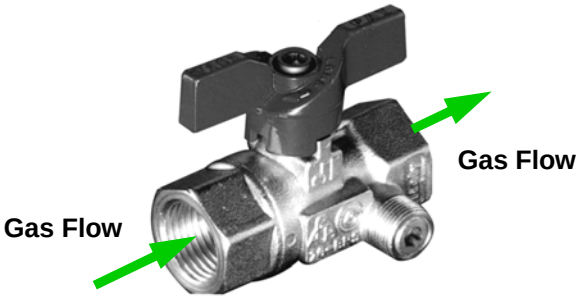
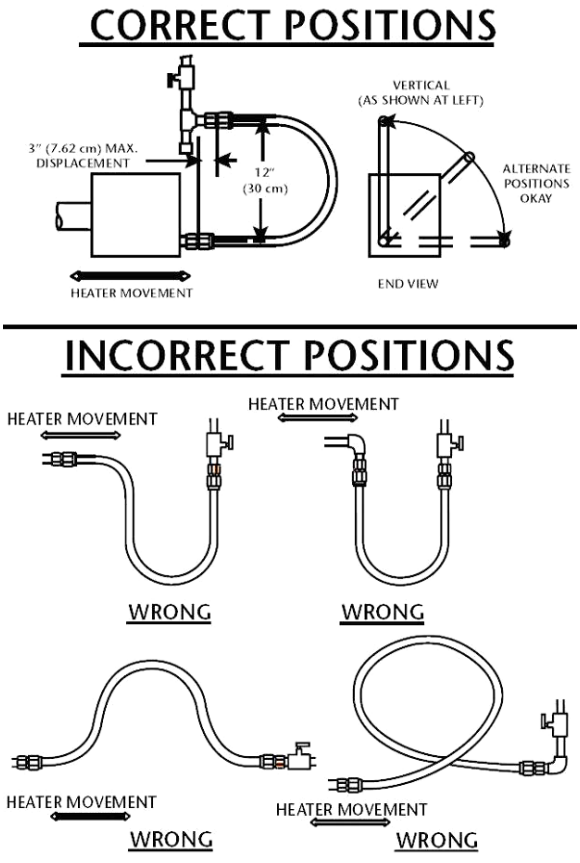


Figure 4. Correct Installation of Flexible Gas Connection



WARNING: FIRE OR EXPLOSION HAZARD - Expansion of the radiant pipe occurs with each firing cycle causing the burner to move with respect to the gas line. This can result in a gas leak producing an unsafe condition. It is therefore essential to provide some flexibility in the final gas line connection by use of an approved flexible connector as shown in the drawings.

* Connector must be certified for use on a radiant tube type infrared heater and must comply with Standard for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10 or with the Standard for Elastomeric Composite Hose and Hose Couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1.
For heaters up to 150,000Btu/h, ½" ID x 24" long
For heaters above 150,000Btu/h, ¾" ID x 36" long
NOTE: For Canada all heaters MUST use a hose 36" long
See Table 3

Table 3

HOSE SIZE	USA	CANADA
3/4"	CE4	*CONTACT FACTORY*

CONNECTOR MUST BE INSTALLED IN A "U" CONFIGURATION. FOR HEATERS UPTO 150,000 BTU/H, A 24" LONG CONNECTOR OF AT LEAST ½" ID MUST BE USED. FOR HEATERS ABOVE 150,000 BTU/H, A 36" LONG CONNECTOR OF AT LEAST ¾" NOMINAL ID MUST BE USED.

Table 4 Gas Supply & Pressures

Gas Type	Natural Gas	LP/Propane Gas
Required Gas Pressure (in W.C) (60,000 TO 150,000 BTU)	5.0	11.0
Required Gas Pressure (in W.C) (170,000 TO 200,000 BTU)	7.0	11.0
Max Supply Pressure (in W.C)	14.0	14.0
Gas Supply	Connection ½" N.P.T thread	

1.5 Electrical Connections

WARNING: Before making electrical connections, switch OFF the main electrical disconnect. There may be more than one disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

This appliance must be electrically grounded

Supply 120V 60Hz single phase.
Standard heater 0.16HP.
Current rating 1.2 amp max (inductive).
Fuse: external 3 amp.

Important: All electrical work should be done by a qualified electrician in strict accordance with the National Electrical Code ANSI/NFPA 70 or Canadian Codes CSA C22.1.

The electrical supply to the heater is by three wires: live, neutral and ground connections.
Install in accordance with all state & local codes.

Where alternative manufacturers controls are used, please refer to their instructions for their installation details.

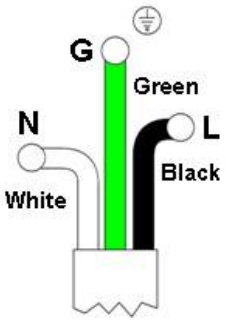


Figure 5a. Single and Multiple Heater Installations 120V Control

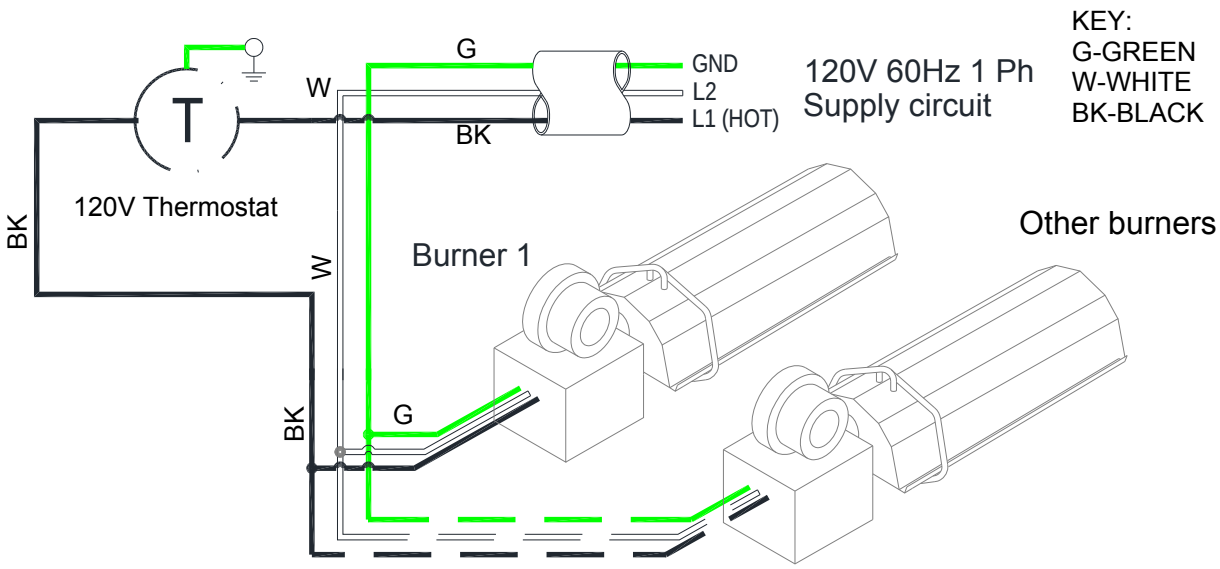


Figure 5b. Single Heater Installations 24V Control

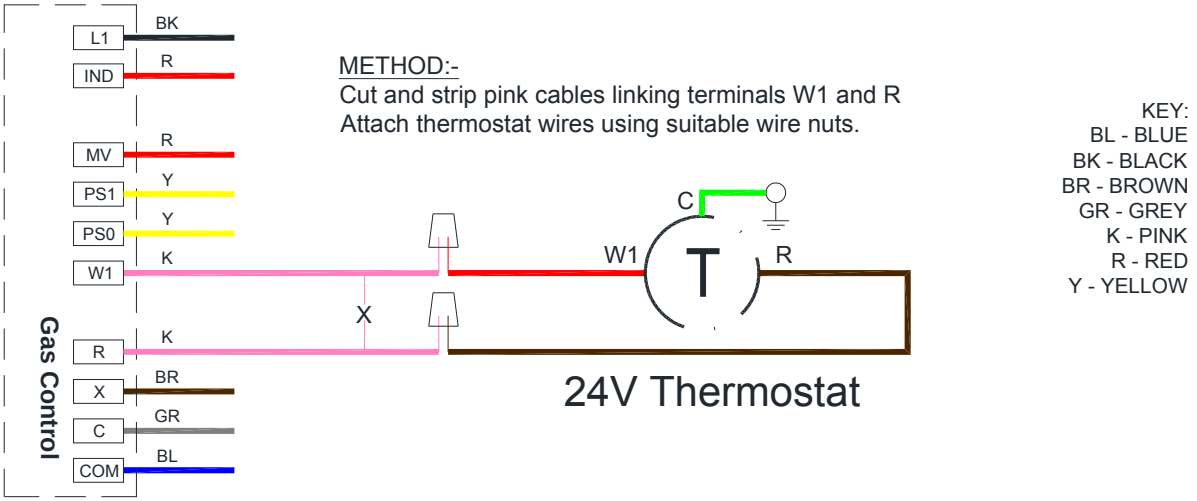


Figure 5c. Multiple Heater Installations 24V Control

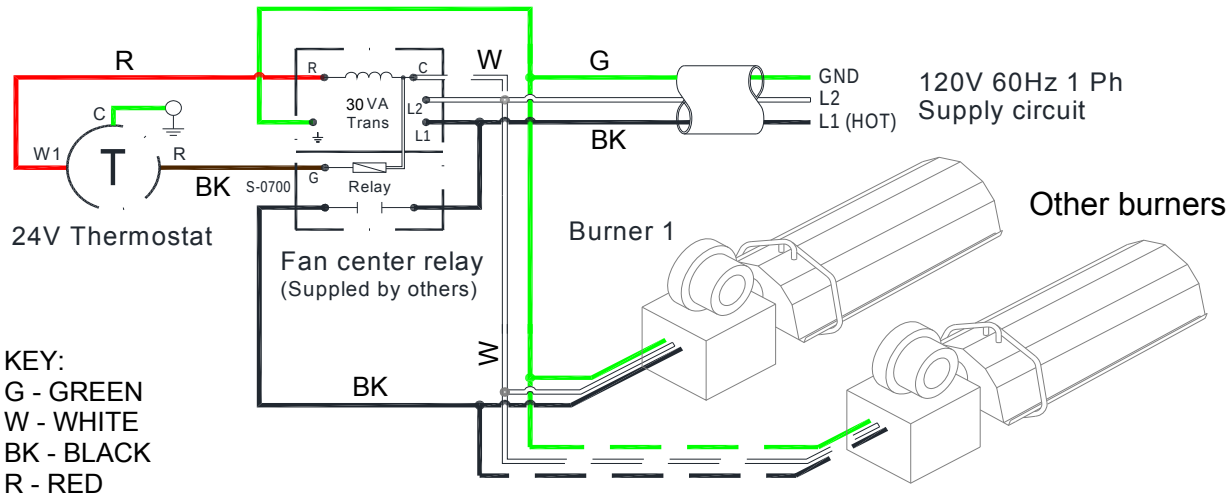
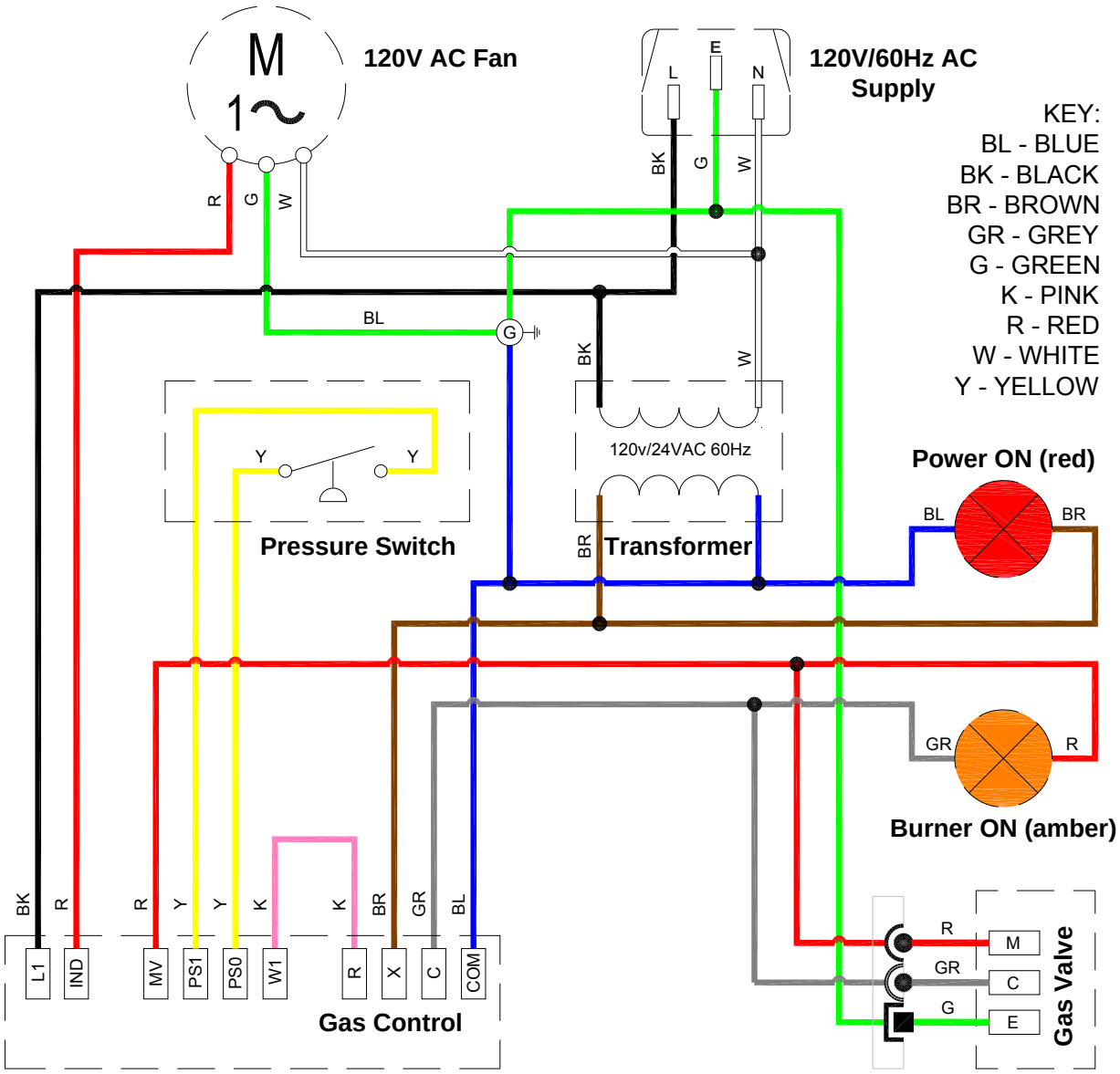


Figure 6. Internal Burner Wiring Diagram.



NOTES:-
Power On light is permanently illuminated when 120V / 60 Hz AC external supply is connected to burner.
Additional wiring is required to install an optional extra thermostat and / or time clock.
If no thermostat is required then a jumper is fitted between terminals R and W1. In this configuration the burner will continuously fire until the 120V power supply is disconnected.
Wire specification:- 18 AWG (1.0mm²), Tri-rated, 105°C

⚠ If any of the original wire as supplied with the appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 220°F/105°C

1.6 Vent Requirements and Details

1.6.1 Unvented units

Heaters may be installed without a vent providing the governing building codes are met and consideration is properly given to possibilities of condensation on cold surfaces.

Installation shall meet the following requirements when unvented:

- Natural or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1000 BTU per hour input of installed heaters.
- Combustion gasses shall not impinge on combustible materials.

1.6.2 Vertical venting

The heater can be installed with a vertical vent.

All vent piping should be adequately supported from the building structure and terminated with an approved terminal. **The maximum recommended vent length is 25ft (7.6m) with a maximum of two elbows**. All connections should be properly sealed. refer fig 7a

1.6.3 Horizontal venting

Individual units can be vented horizontally through side walls. Recommended terminals are Part Numbers 111848 for 4" and 111850 for 6".

Distances from adjacent public walkways, adjacent buildings, openable windows and building openings, consistent with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* or the *Natural Gas and Propane Installation Code, CSA B149.1.*

Maximum length of vent is 25ft (7.6m) with two - 90° elbows.

Runs of 12ft (3.6m) or shorter can use 4" (101mm) dia vent. Runs over 12ft (3.6m) should use 6" (152mm) vent pipe.

Any portion of vent that passes through a combustible wall must be insulated, or use an approved insulating thimble.

Standard vent terminals must extend at least 6" (152mm) from the wall and at least 24" (609mm) from any combustible overhang. This protects the building material from degradation by the vent gasses.

Vent joints should be sealed and secured according to the vent manufacturers instructions. Should condensation occur the vent should be shortened or insulated.

The terminal should be at least 3ft (0.91m) away from any air intake to the building.

If the heater is equipped with ducted combustion air, the vent terminal must be at least 3ft (0.91m) away from the air inlet and located higher than the inlet.

The vent terminal must be installed at a suitable height above the ground to prevent blockage by snow.

1.7 Fresh Air Intake

Whenever the heater is installed in locations where airborne dust or other pollutants are present, a fresh air supply should be ducted to the burner.

A fresh air duct of 4"(101mm) dia. should be installed from the fresh air to the air intake connection on the fan housing. A flexible jointing piece should be installed at the fan connection with hose clamps to facilitate expansion and contraction.

The maximum recommended length air duct is 25ft (7.6m) and the maximum number of elbows is two. The minimum length is 18" (456mm).

The location of the fresh air duct inlet must be where it will receive dust free clean air. An inlet cap with bird screen must be fitted at the inlet of the duct. If the duct inlet is located above the roof the underside of the inlet terminal must be at least 2ft (0.61m) above roof level and at least 10" (254mm) above any projection on the roof within 7ft (2.1m) of the inlet. Intake pipe, fittings and sealant are not furnished by the manufacturer. Refer fig 7c & d.

Figure 7.a Vertical Venting.

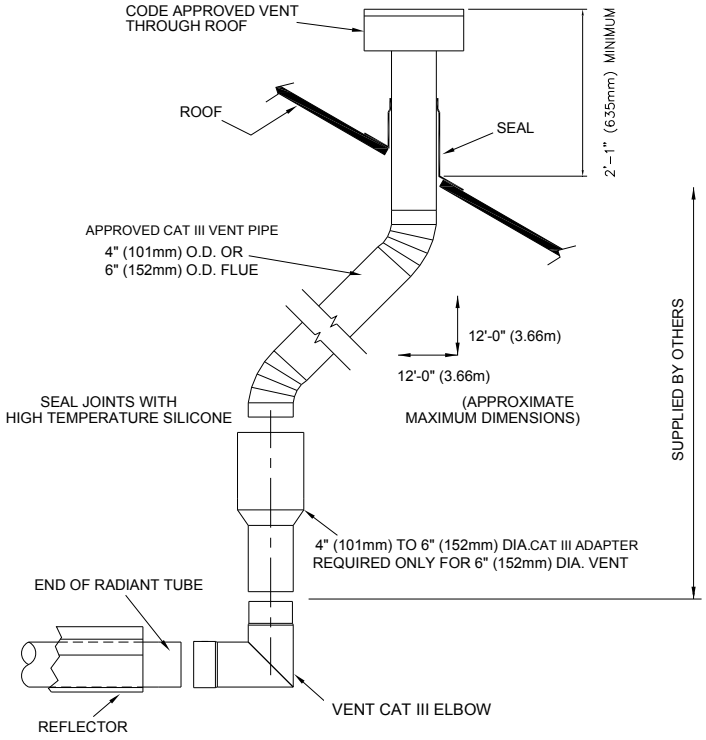
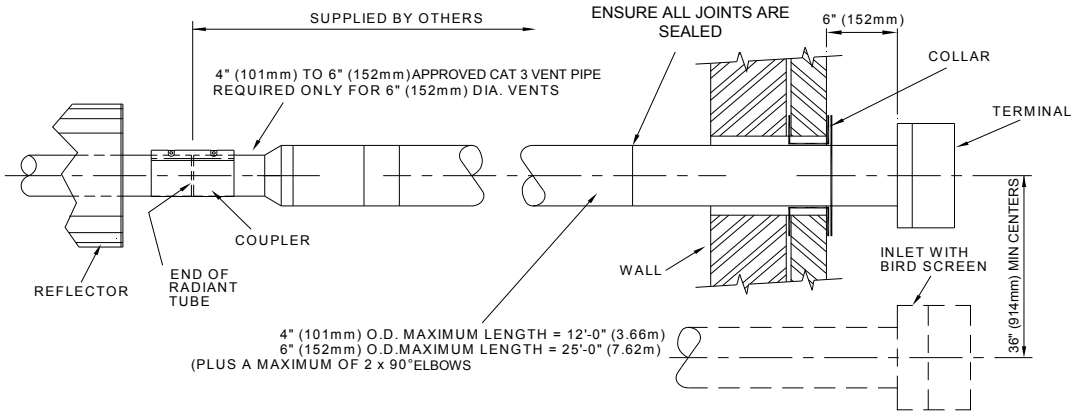


Figure 7.b Horizontal Venting.



NOTE: The vent terminal should be installed so as to be in the same atmospheric pressure zone as the combustion air inlet of the appliance

Figure 7.c Fresh Air Ducted Intake.

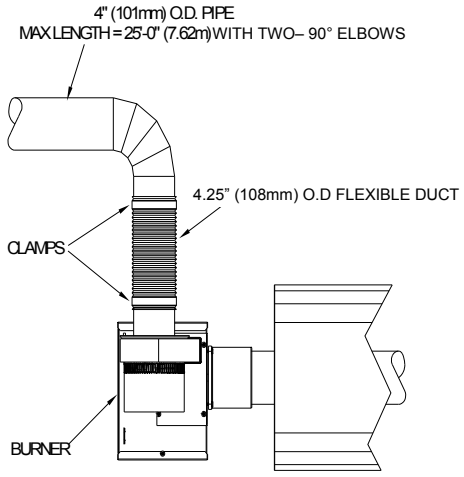
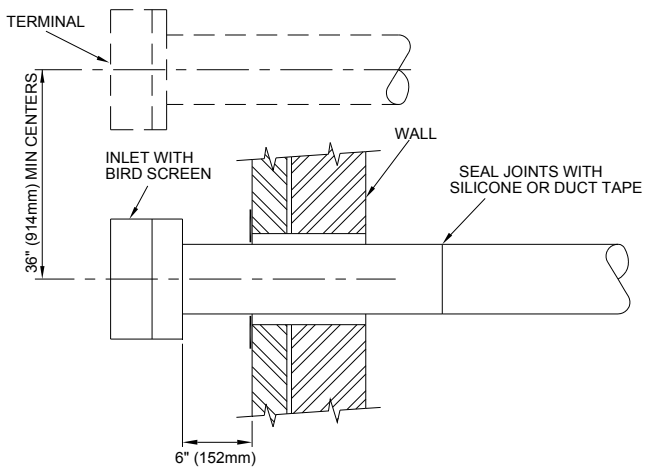


Figure 7.d Wall Terminal Intake Kit.



1.8 Technical Details - Table 5

No of Injectors	1
Gas Connection	½" N.P.T
Electrical Supply	120 volt 1 phase 60Hz
Vent size (in)	4" or 6" (101mm or 152mm)
Unitary Fan Motor Details	120 volt 1 phase 60Hz
Current Rating	1.2A MAX
Ignition	Electronic Program Start up with Spark Ignition

Burner Rating	**Natural Gas**	**LP Gas**	**Min. Heater Length**	**Max. Heater Length**	**Min. Heater Length**	**Max. Heater Length**
	BTU/Hr	**BTU/Hr**	**S ft (m)**	**S ft (m)**	**U ft (m)**	**U ft (m)**
60	60,000	60,000	20 (6.1)	40 (12.1)	20 (6.1)	40 (12.1)
80	80,000	80,000	20 (6.1)	40 (12.1)	20 (6.1)	40 (12.1)
100	100,000	100,000	30 (9.1)	50 (15.2)	40 (12.1)	40 (12.1)
125	123,500	125,000	40 (12.1)	60 (18.3)	40 (12.1)	60 (18.3)
150	150,000	150,000	40 (12.1)	70 (21.3)	40 (12.1)	60 (18.3)
170	169,000	169,000	50 (15.2)	80 (24.4)	60 (18.3)	80 (24.4)
200	200,000	**N/A**	50 (15.2)	80 (24.4)	60 (18.3)	80 (24.4)

ALTITUDE CONVERSION KITS ARE AVAILABLE

Burner Rating	**Natural Gas 0-2000 ft (0-610m)**			**LP Gas 0-2000 ft (0-610m)**		
	Burner Orifice Plate	**Injector**	**Injector Pressure**	**Burner Orifice Plate**	**Injector**	**Injector Pressure**
	Part No.	Part No.	inches WC	Part No.	Part No.	inches WC
60	269954	270400	4.2	269948	270398	6.0
80	269955	270402	3.5	269949	270399	5.2
100	269943	270404	3.5	269950	270399	8.2
125	269944	270406	4.1	269951	270400	6.6
150	269945	270408	4.2	269952	270401	7.0
170	269946	270409	3.4	269953	270403	5.7
200	269946	270410	3.5	**N/A**		

CANADA ONLY 10% DERATE	**Natural Gas 2001-4500 ft (611-1370m)**			**LP Gas 2001-4500 ft (611-1370m)**		
	Burner Orifice Plate	**Injector**	**Injector Pressure**	**Burner Orifice Plate**	**Injector**	**Injector Pressure**
Burner Rating	Part No.	Part No.	inches WC	Part No.	Part No.	inches WC
60	269954	270400	4.0	269948	270398	5.8
80	269955	270402	3.3	269949	270399	5.0
100	269943	270404	3.3	269950	270399	8.0
125	269944	270406	3.9	269951	270400	6.4
150	269945	270408	4.0	269952	270401	6.8
170	269946	270409	3.2	**N/A**		
200	269946	270410	3.3			

Burner Rating	Natural Gas			LP Gas			All types
	Combustion Fan Details		Pressure Switch	Combustion Fan Details		Pressure Switch	Burner Head
	Fan Type	Orifice Part No.	Part No.	Fan Type	Orifice Part No.	Part No.	Part No.
60	270476	269923	270386	270476	269925	270386	270425
80		269922			269925		
100		269923			269928		
125		269927			269931		
150		269926			269933		
170		269930		270475	269937		
200	270475	269938	270387	**N/A**			

Burner Rating	U Tube				Straight Tube							
	U20	U40	U60	U80	S10	S20	S30	S40	S50	S60	S70	S80
60	●	●				●	●	●				
80	●	●				●	●	●				
100		●					●	●	●			
125		●	●					●	●	●		
150		●	●					●	●	●	●	
170			●	●					●	●	●	●
200			●	●					●	●	●	●

Burner Rating	Tube Type Material		Min. Distance to Bend ft (m)
	Calcoat™	Mild Steel	
60	TUBE 1	REMAINDER	10 (3.0)
80	TUBE 1	REMAINDER	10 (3.0)
100	TUBE 1	REMAINDER	15 (4.6)
125	TUBE 1	REMAINDER	20 (6.1)
150	TUBE 1	REMAINDER	20 (6.1)
170	TUBE 1 & 2	REMAINDER	25 (7.6)
200	TUBE 1 & 2	REMAINDER	25 (7.6)

Options * Not available on LP Gas

1 All standard units fitted with unvented vent, natural gas and aluminized steel reflectors.
2 1 off 180° bend (U) or upto 2 off 90° bends (L) can be fitted at no less than 50% of the total heater length.
3 4*" (101mm) or 6" (152mm) vent terminal.*
4 Combustion air kit.
5 Reflector end caps.
6 Altitude conversion kit.
7 Propane and propane altitude conversion kit.

2. Assembly Instructions.

PLEASE READ *this section prior to assembly to familiarize yourself with the components and tools you require at the various stages of assembly. Carefully open the packaging and check the contents against the parts and check list.*

The manufacturer reserves the right to alter specifications without prior notice.

Please ensure that all packaging is disposed of in a safe environmentally friendly way.

For your own safety we recommend the use of safety boots and leather faced gloves when handling sharp or heavy items. The use of protective eye wear is also recommended.

2.1 Tools Required.

Suitable alternative tools may be used.

The following tools and equipment are advisable to complete the tasks laid out in this manual.

Saw Horses

Leather Faced Gloves

Phillips Screwdriver

Wrench Set

Cordless Drill

5/16" Drive

3/16" (5mm)
5/32" (4mm)
Allen wrench

Tape Measure

2.2 Assembly Notes.

Please read these assembly notes in conjunction with the correct assembly drawings (figs 9 to 19).

2.2.1 Tubes

Each heating unit has two types of emitter tube. For details of the tube types please refer to the table (page 13 of this instruction manual).

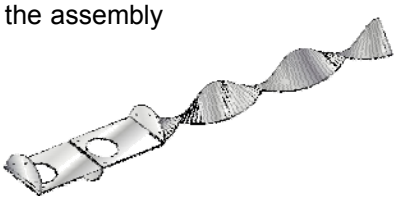
Identify and position tubes on saw horses. For aesthetics it is advisable to position **all tube seams facing down.** Position coupling fastener so that these cannot be seen from beneath the heater.

Mark out the position of the bracket centers from the dimensions shown on the assemblers' drawings.

Turbulators: *Ensure that the correct turbulator or burner insert is fitted, as this could void your warranty if they are incorrectly fitted or omitted when necessary.*

2.2.2 Turbulators (where fitted)

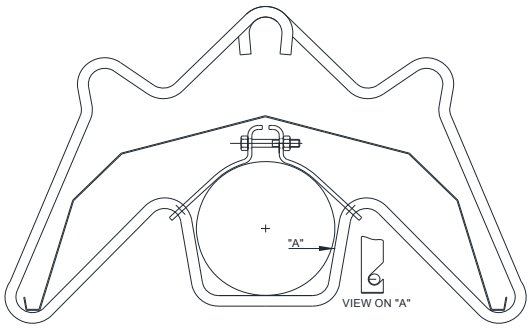
Insert turbulator into correct tube as indicated in the assembly drawings.



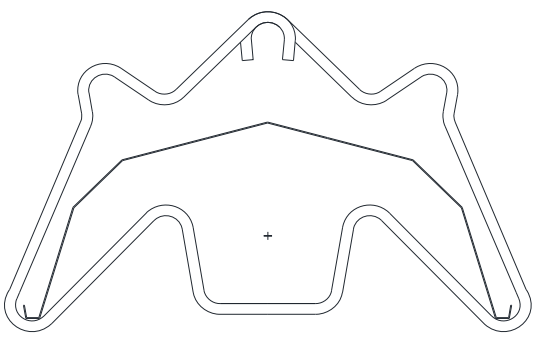
2.2.3 Brackets

There can be four types of brackets supplied with these heaters:

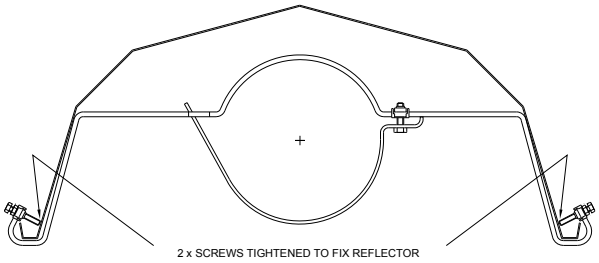
- *Type 'H' are suspension brackets with tube straps.*



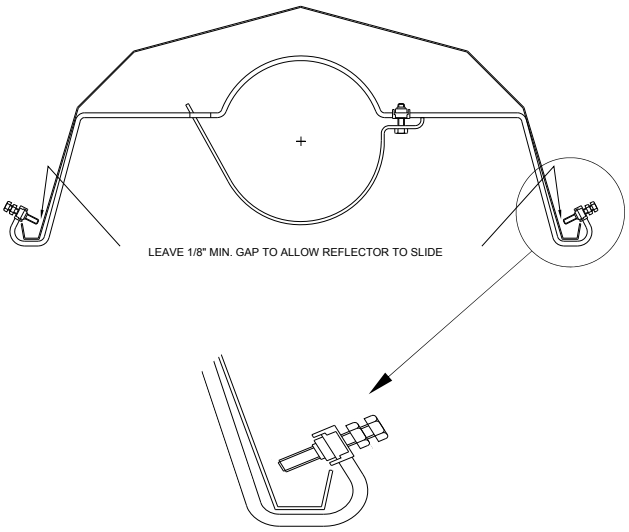
- *Type 'G' are suspension brackets with no tube straps.*



- *Type 'F' are fixed reflector brackets.*

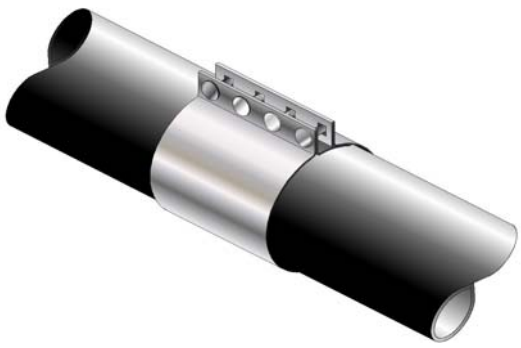


- *Type 'S' are sliding reflector brackets.*



Slip the suspension brackets onto the tube assembly. The fixed suspension point 'H' shown on the drawings are adjacent to the burner and secures the first suspension bracket to the tube with a tube strap. All other suspension brackets 'G' shown on the drawings, have floating suspension points.

Reflectors are fixed at point 'F' with a reflector support bracket and reflectors are held in position with fixing screws. Fixed and sliding joints alternate along the heater at the spacings indicated on the individual heater assembly sheets.



2.2.4 Couplers

The couplers are used for joining radiant tubes and U or L bends.

Slide the coupler over the tube ensuring that the screw stop has butted up to the tube ends. Using the 9/16" wrench to tighten the bolts.

At this point raise the tube assembly into position and suspend from previously fixed chains (Working Load 100lb). Longer tube assemblies may be raised in more than one sub-assembly with final tube connection made in the air. It is recommended that the heater be suspended to slope slightly downward from the burner approximately 1" in 20 feet, but not more than 2" total overall.

DO NOT OVERTIGHTEN.

Moving between the four bolts, tighten each ensuring that equal pressure is applied to each bolt in turn. Complete assembly by drilling and screwing self tapping retention zip screws.

2.2.5 Reflectors.

After removing the protective plastic coating (if fitted), slip the reflectors through the hanger brackets until they overlap each other.

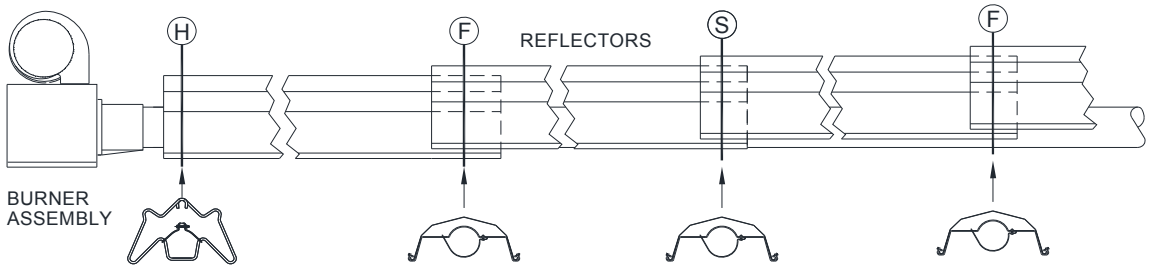
All reflectors must be positioned/ attached to the brackets exactly as detailed in the assembly drawings.

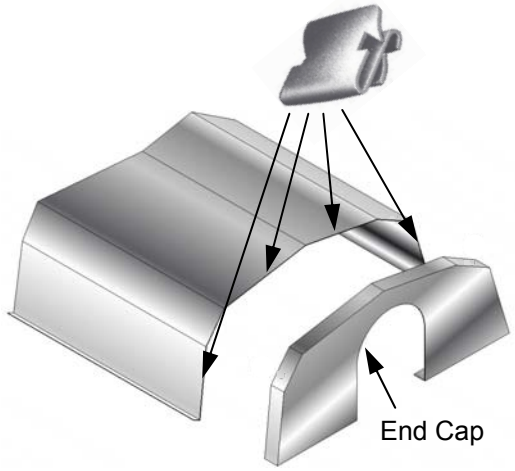
The first and second reflector are fixed at the point F by a type F reflector support bracket and are held in place by tightening the fixing screws.

Each subsequent reflector must **OVERLAP** the previous one as shown below and to a distance as indicated by their individual assembly sheets.

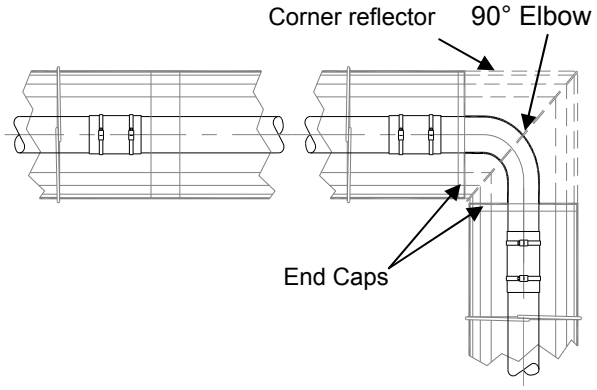
Alternate fixings of further reflectors by type S and type F reflector brackets and space as indicated by individual assembly sheets.

Reflector support bracket assemblies are fitted at each reflector joint, with the clamp screws adjusted so that reflectors are fixed together.





Typical usage of optional bend kits:



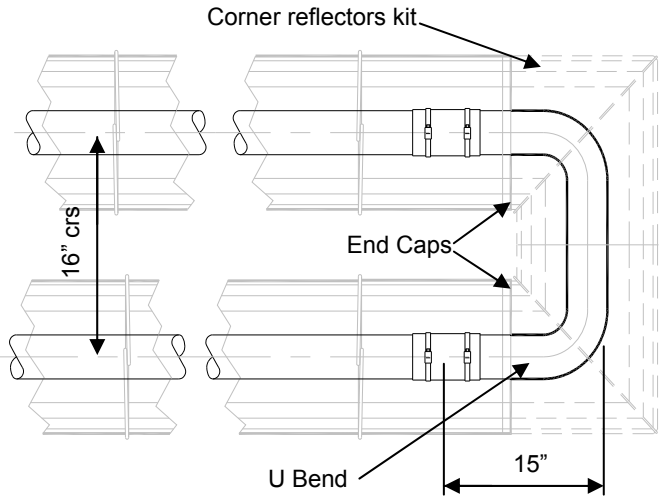
2.2.6 End Caps (optional)

Position an end cap beneath the reflector profile (where required) with the end cap flanges facing inwards. Fasten to reflector using the four 'Z' clips.

2.2.7 Bend(s) (where fitted)

The heater can be installed with 1 or 2 90° bends or a 180° U bend.

Slide the bend into the open end of the coupler ensuring that the screw stop has butted up to the tube ends. Refer to 2.2.4 for fastening.



2.2.8 Burner/Fan Assembly.

Slide the burner assembly onto the open tube end, ensuring it is fully engaged. Secure with set screws.

For the purpose of unvented applications, a 4" 90° elbow should be used on the terminating end of the radiant tube sections. This elbow should be turned with the outlet facing either side.

Connect Gas and Electrical supplies as described in sections 1.4 and 1.5.

2.2.9 Detailed Assembly Drawings

The following pages show the technical dimensional details of the range of heaters.

Please note the heater type, length and reference number from the delivery/advice note before identifying the correct model drawing.

Bends must be fitted at a distance of at least 50% of the total heat exchanger e.g. for a 60ft long heater, the closest to the burner a bend can be is 30ft.

Figure . 8. Possible Heater Orientations

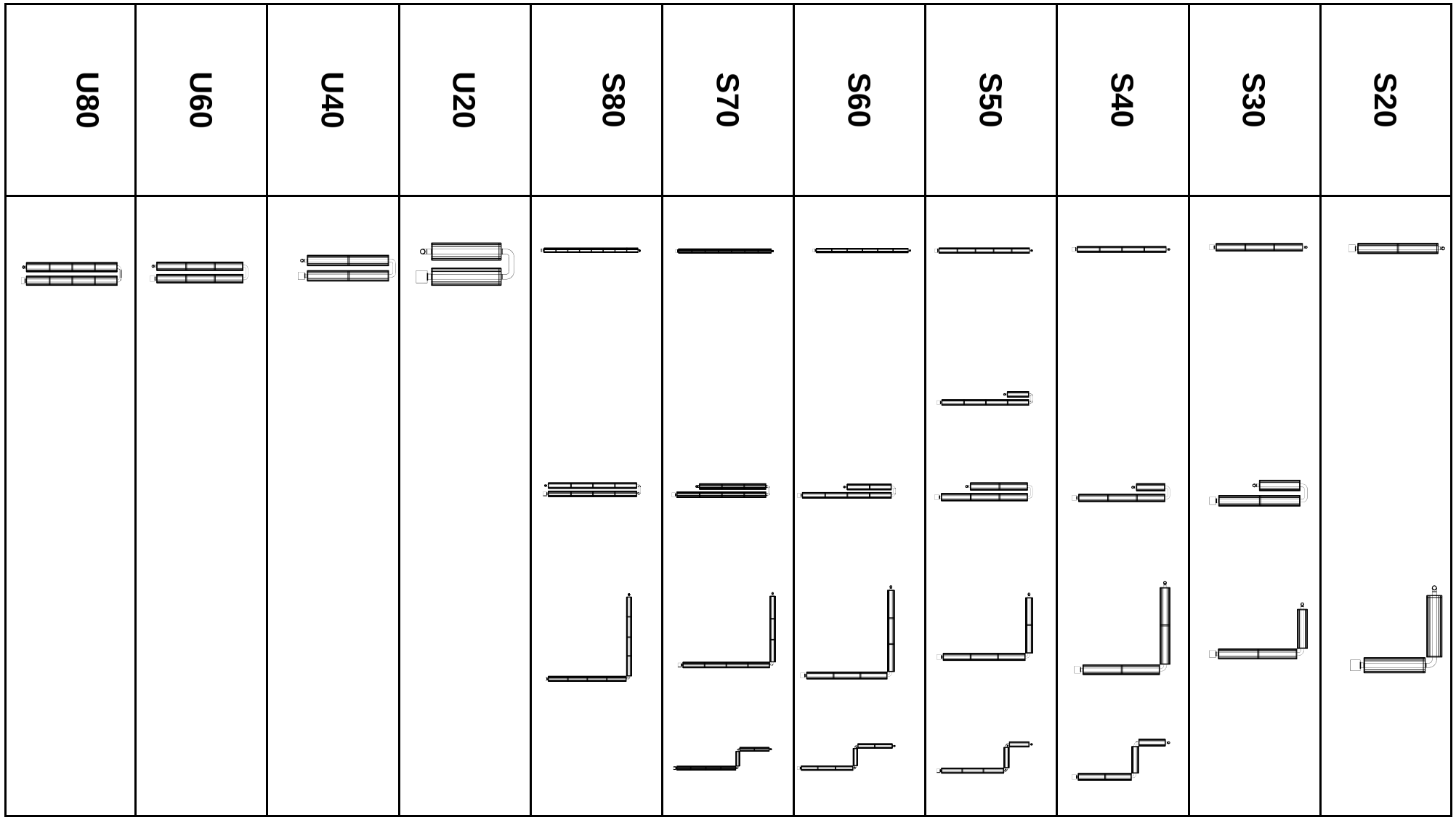
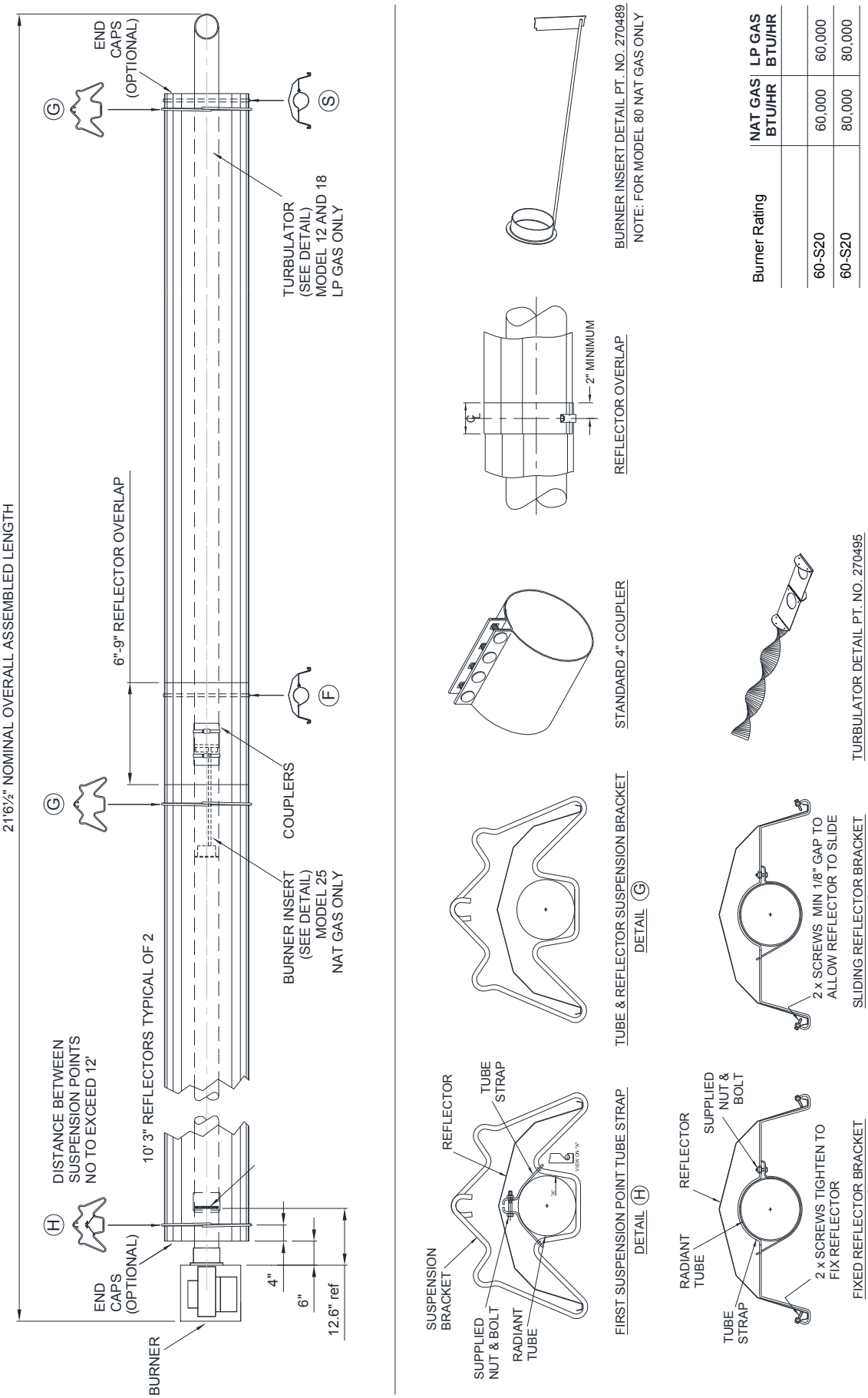
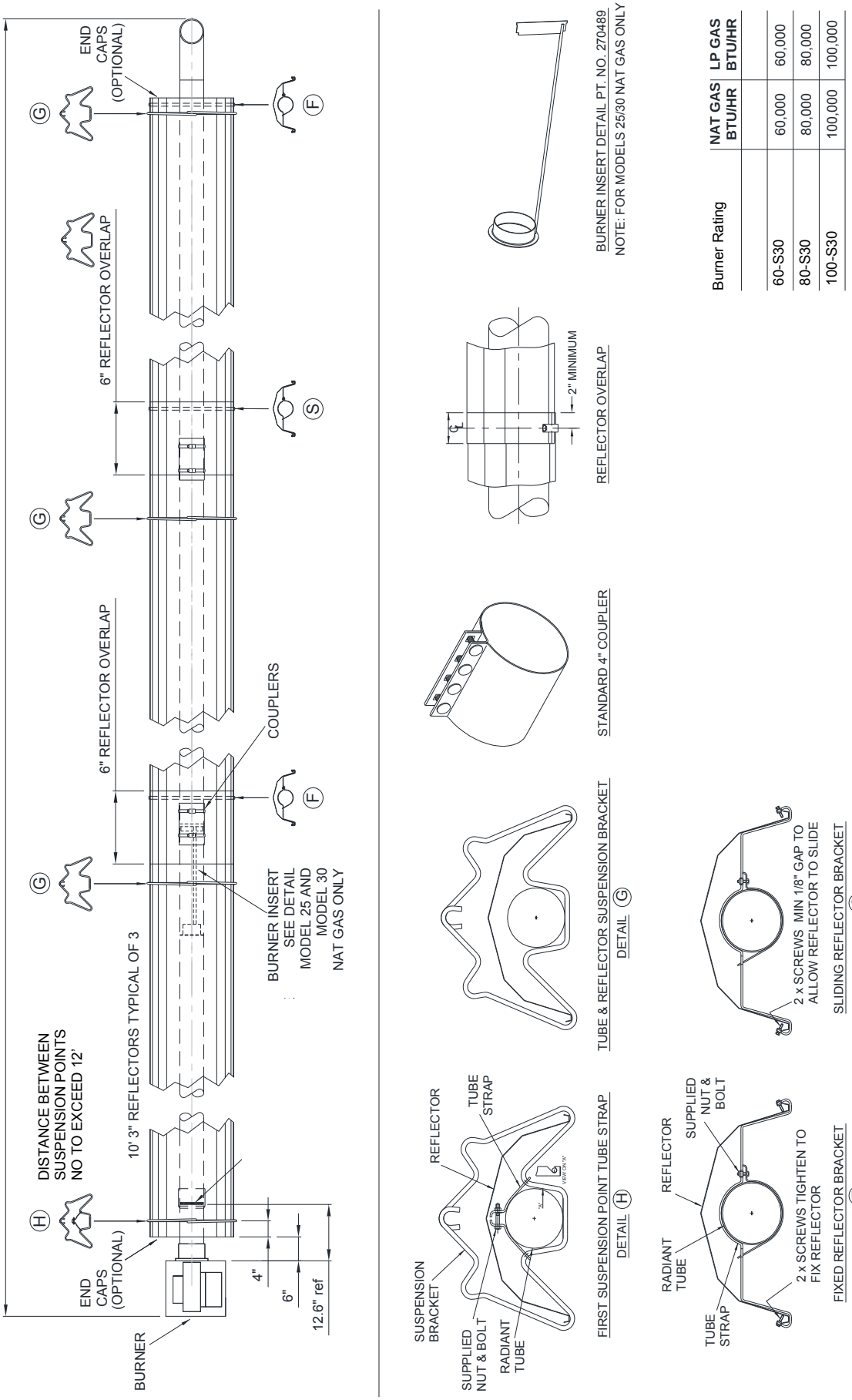


Figure 9. Heater Assembly: Model Linear 60-S20 and 80-S20.



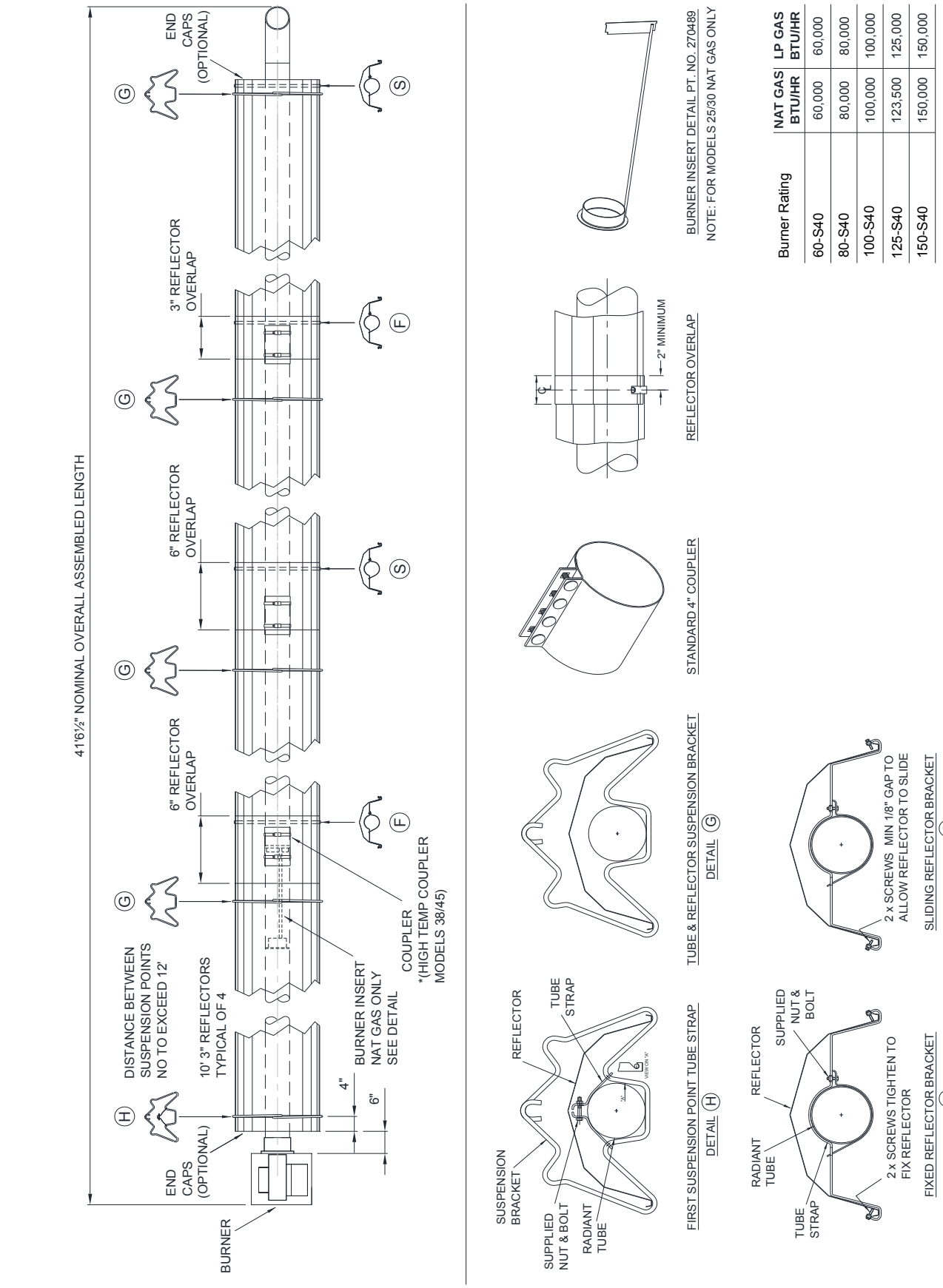
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
60-S20	60,000	60,000
60-S20	80,000	80,000

Figure 10. Heater Assembly: Model Linear 60-S30, 80-S30 and 100-S30.


31'6½" NOMINAL OVERALL ASSEMBLED LENGTH
DISTANCE BETWEEN SUSPENSION POINTS NO TO EXCEED 12'
10' 3" REFLECTORS TYPICAL OF 3
6" REFLECTOR OVERLAP
6" REFLECTOR OVERLAP
END CAPS (OPTIONAL)
END CAPS (OPTIONAL)
COUPLERS
BURNER INSERT SEE DETAIL MODEL 25 AND MODEL 30 NAT GAS ONLY
BURNER
4"
6"
12.6" ref
FIRST SUSPENSION POINT TUBE STRAP DETAIL (H)
SUSPENSION BRACKET
SUPPLIED NUT & BOLT
RADIANT TUBE
REFLECTOR
TUBE STRAP
TUBE & REFLECTOR SUSPENSION BRACKET DETAIL (G)
STANDARD 4" COUPLER
FIXED REFLECTOR BRACKET DETAIL (F)
RADIANT TUBE
REFLECTOR
SUPPLIED NUT & BOLT
TUBE STRAP
2 x SCREWS TIGHTEN TO FIX REFLECTOR
SLIDING REFLECTOR BRACKET DETAIL (S)
2 x SCREWS MIN 1/8" GAP TO ALLOW REFLECTOR TO SLIDE
2" MINIMUM
REFLECTOR OVERLAP
BURNER INSERT DETAIL PT. NO. 270489
NOTE: FOR MODELS 25/30 NAT GAS ONLY

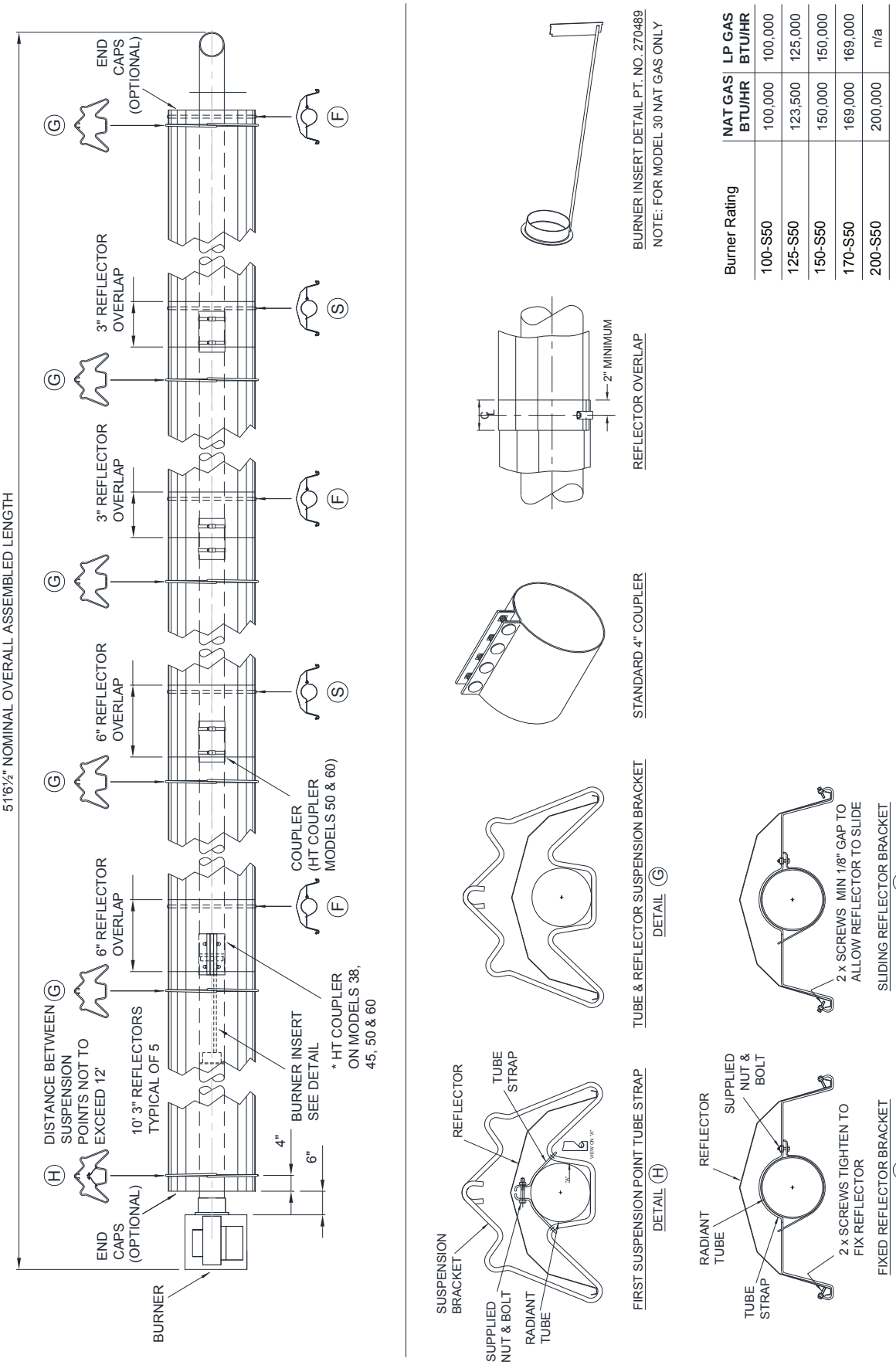
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
60-S30	60,000	60,000
80-S30	80,000	80,000
100-S30	100,000	100,000

Figure 11. Heater Assembly: Model Linear 60-S40, 80-S40, 100-S40, 125-S40 and 150-S40.


41'6½" NOMINAL OVERALL ASSEMBLED LENGTH
BURNER
END CAPS (OPTIONAL)
DISTANCE BETWEEN SUSPENSION POINTS NO TO EXCEED 12'
10' 3" REFLECTORS TYPICAL OF 4
6" REFLECTOR OVERLAP
3" REFLECTOR OVERLAP
END CAPS (OPTIONAL)
4"
6"
BURNER INSERT NAT GAS ONLY SEE DETAIL
COUPLER *(HIGH TEMP COUPLER MODELS 38/45)
SUSPENSION BRACKET
SUPPLIED NUT & BOLT
RADIANT TUBE
REFLECTOR
TUBE STRAP
FIRST SUSPENSION POINT TUBE STRAP DETAIL (H)
TUBE & REFLECTOR SUSPENSION BRACKET DETAIL (G)
STANDARD 4" COUPLER
2" MINIMUM
REFLECTOR OVERLAP
BURNER INSERT DETAIL PT. NO. 270489
NOTE: FOR MODELS 25/30 NAT GAS ONLY
2 x SCREWS TIGHTEN TO FIX REFLECTOR
FIXED REFLECTOR BRACKET DETAIL (F)
2 x SCREWS MIN 1/8" GAP TO ALLOW REFLECTOR TO SLIDE
SLIDING REFLECTOR BRACKET DETAIL (S)

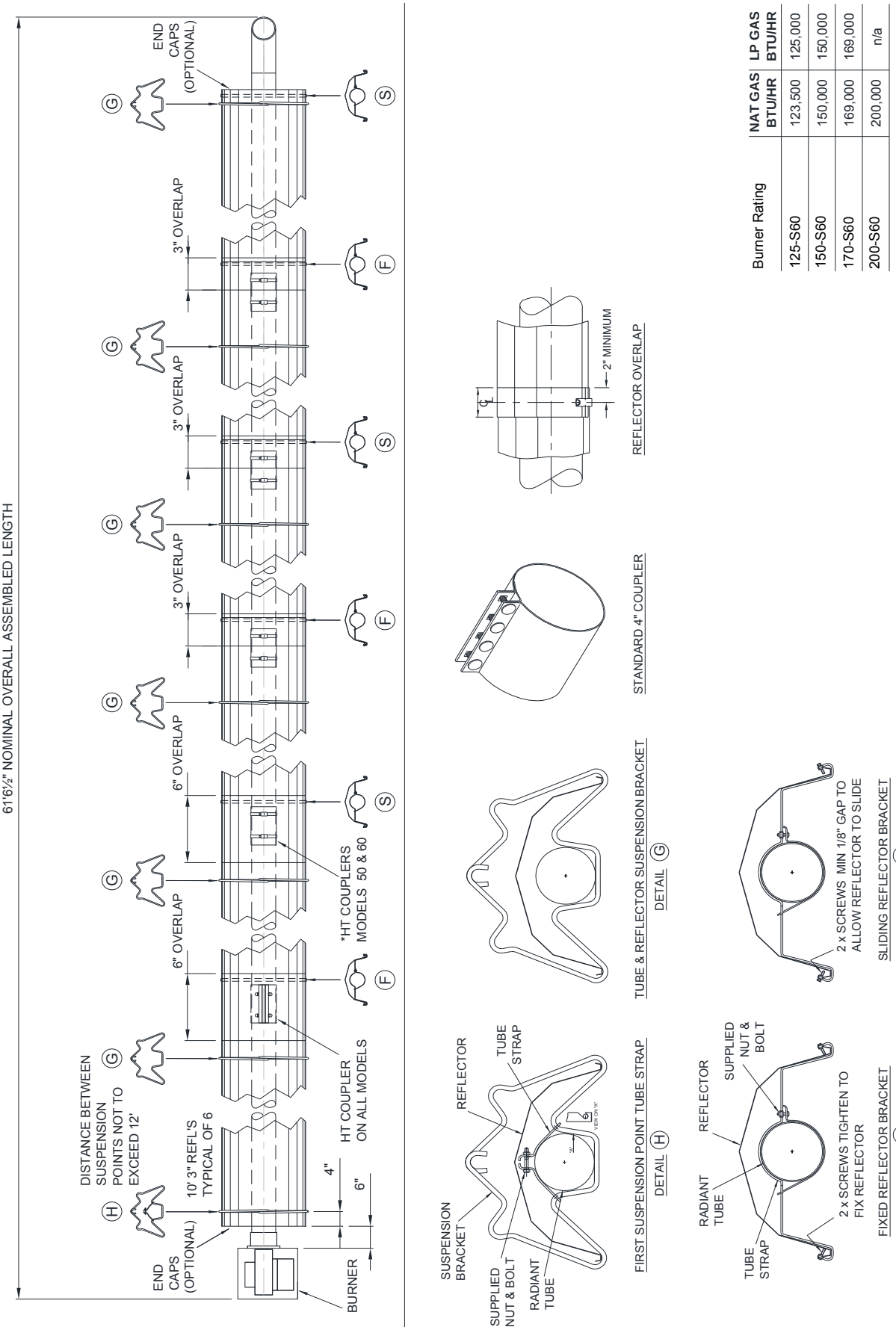
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
60-S40	60,000	60,000
80-S40	80,000	80,000
100-S40	100,000	100,000
125-S40	123,500	125,000
150-S40	150,000	150,000

Figure 12. Heater Assembly: Model Linear 100-S50, 125-S50, 150-S50, 170-S50, and 200-S50


51'6½" NOMINAL OVERALL ASSEMBLED LENGTH
DISTANCE BETWEEN SUSPENSION POINTS NOT TO EXCEED 12'
10' 3" REFLECTORS TYPICAL OF 5
6" REFLECTOR OVERLAP
3" REFLECTOR OVERLAP
END CAPS (OPTIONAL)
BURNER
BURNER INSERT SEE DETAIL
* HT COUPLER ON MODELS 38, 45, 50 & 60
COUPLER (HT COUPLER MODELS 50 & 60)
4"
6"
SUSPENSION BRACKET
SUPPLIED NUT & BOLT
RADIANT TUBE
REFLECTOR
TUBE STRAP
FIRST SUSPENSION POINT TUBE STRAP DETAIL (H)
TUBE & REFLECTOR SUSPENSION BRACKET DETAIL (G)
STANDARD 4" COUPLER
2" MINIMUM
REFLECTOR OVERLAP
BURNER INSERT DETAIL PT. NO. 270489
NOTE: FOR MODEL 30 NAT GAS ONLY
2 x SCREWS TIGHTEN TO FIX REFLECTOR
FIXED REFLECTOR BRACKET DETAIL (F)
2 x SCREWS MIN 1/8" GAP TO ALLOW REFLECTOR TO SLIDE
SLIDING REFLECTOR BRACKET DETAIL (S)

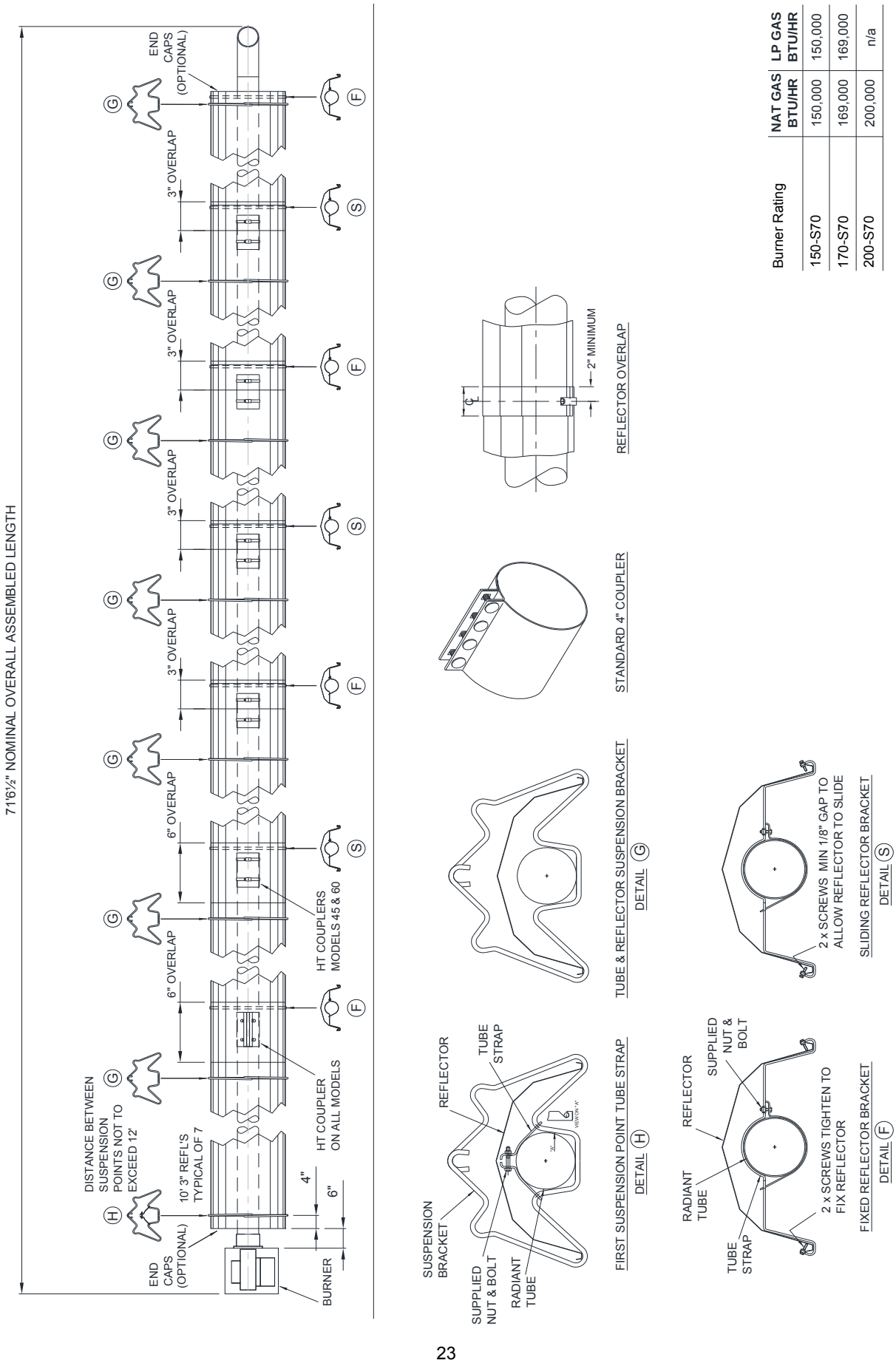
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
100-S50	100,000	100,000
125-S50	123,500	125,000
150-S50	150,000	150,000
170-S50	169,000	169,000
200-S50	200,000	n/a

Figure 13. Heater Assembly: Model Linear 125-S60, 150-S60, 170-S60 and 200-S60


61'6½" NOMINAL OVERALL ASSEMBLED LENGTH
END CAPS (OPTIONAL)
DISTANCE BETWEEN SUSPENSION POINTS NOT TO EXCEED 12'
10' 3" REFL'S TYPICAL OF 6
HT COUPLER ON ALL MODELS
4"
6"
BURNER
6" OVERLAP
3" OVERLAP
*HT COUPLERS MODELS 50 & 60
END CAPS (OPTIONAL)
SUSPENSION BRACKET
SUPPLIED NUT & BOLT
RADIANT TUBE
REFLECTOR
TUBE STRAP
FIRST SUSPENSION POINT TUBE STRAP DETAIL (H)
TUBE & REFLECTOR SUSPENSION BRACKET DETAIL (G)
2" MINIMUM
REFLECTOR OVERLAP
STANDARD 4" COUPLER
2 x SCREWS TIGHTEN TO FIX REFLECTOR
FIXED REFLECTOR BRACKET DETAIL (F)
2 x SCREWS MIN 1/8" GAP TO ALLOW REFLECTOR TO SLIDE
SLIDING REFLECTOR BRACKET DETAIL (S)

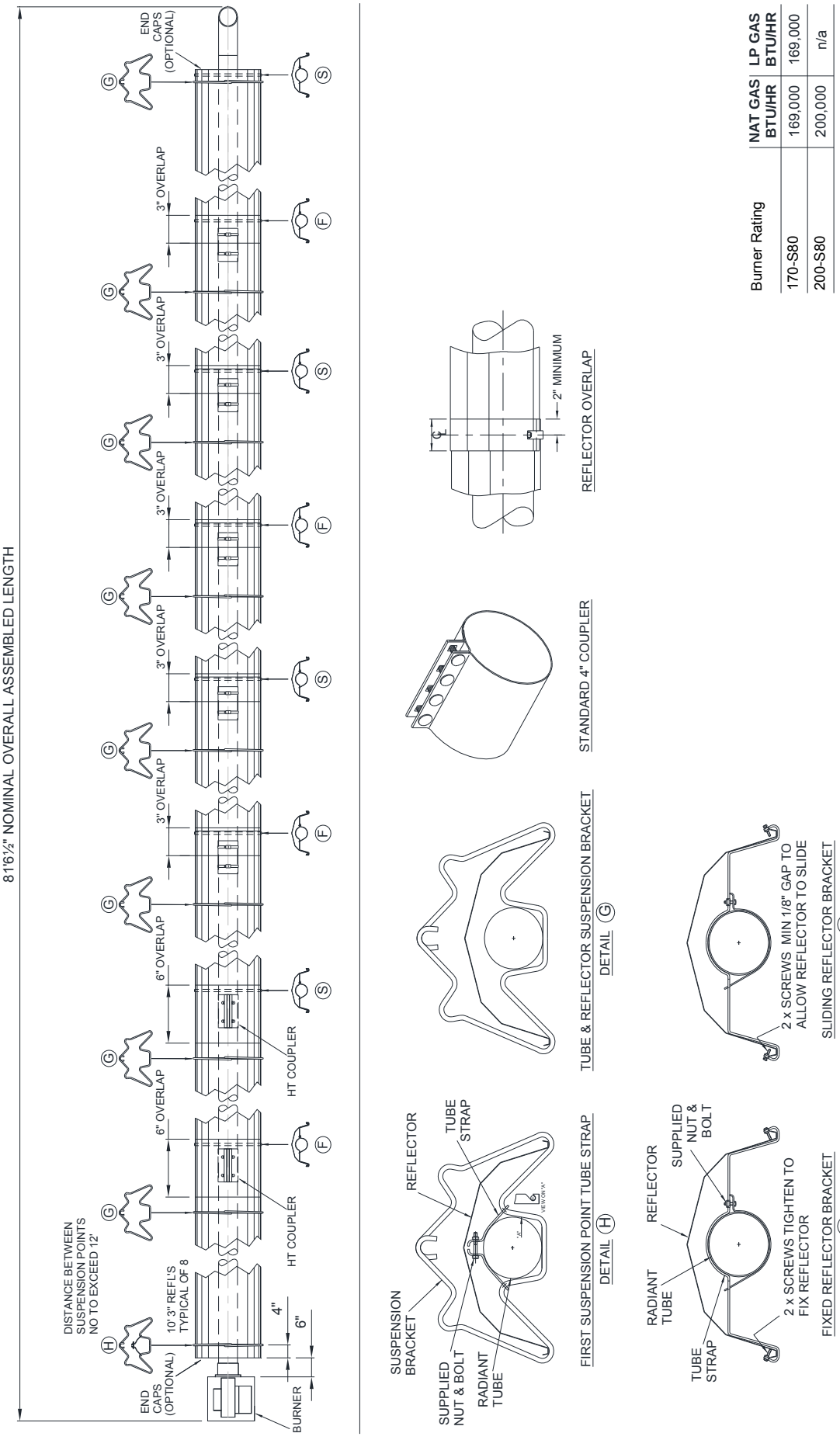
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
125-S60	123,500	125,000
150-S60	150,000	150,000
170-S60	169,000	169,000
200-S60	200,000	n/a

Figure 14. Heater Assembly: Model Linear 150-S70, 170-S70 and 200-S70.



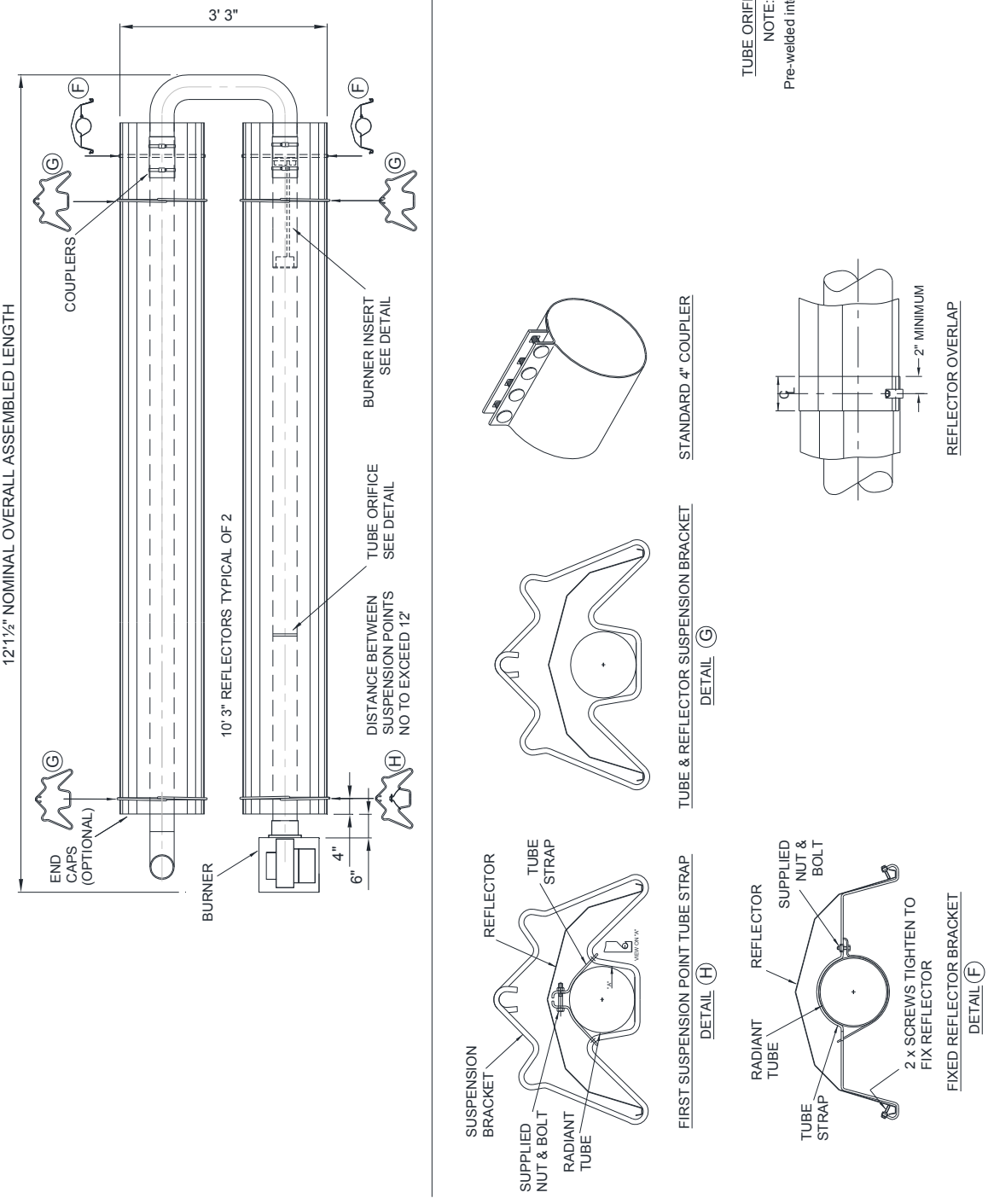
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
150-S70	150,000	150,000
170-S70	169,000	169,000
200-S70	200,000	n/a

Figure 15. Heater Assembly: Model Linear 170-S80 and 200-S80



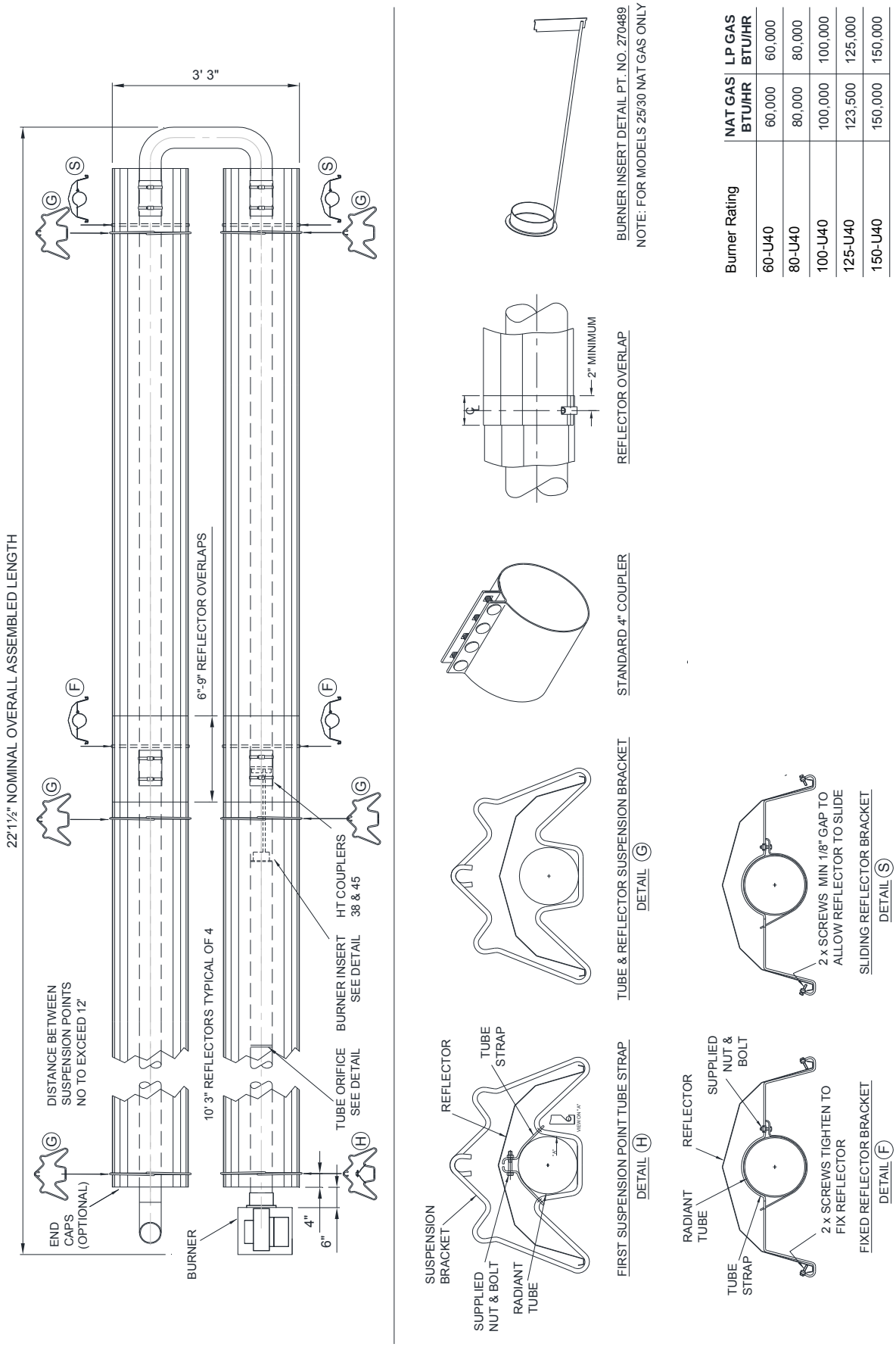
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
170-S80	169,000	169,000
200-S80	200,000	n/a

Figure 16. Heater Assembly: Model U tube 60-U20 and 80-U20.



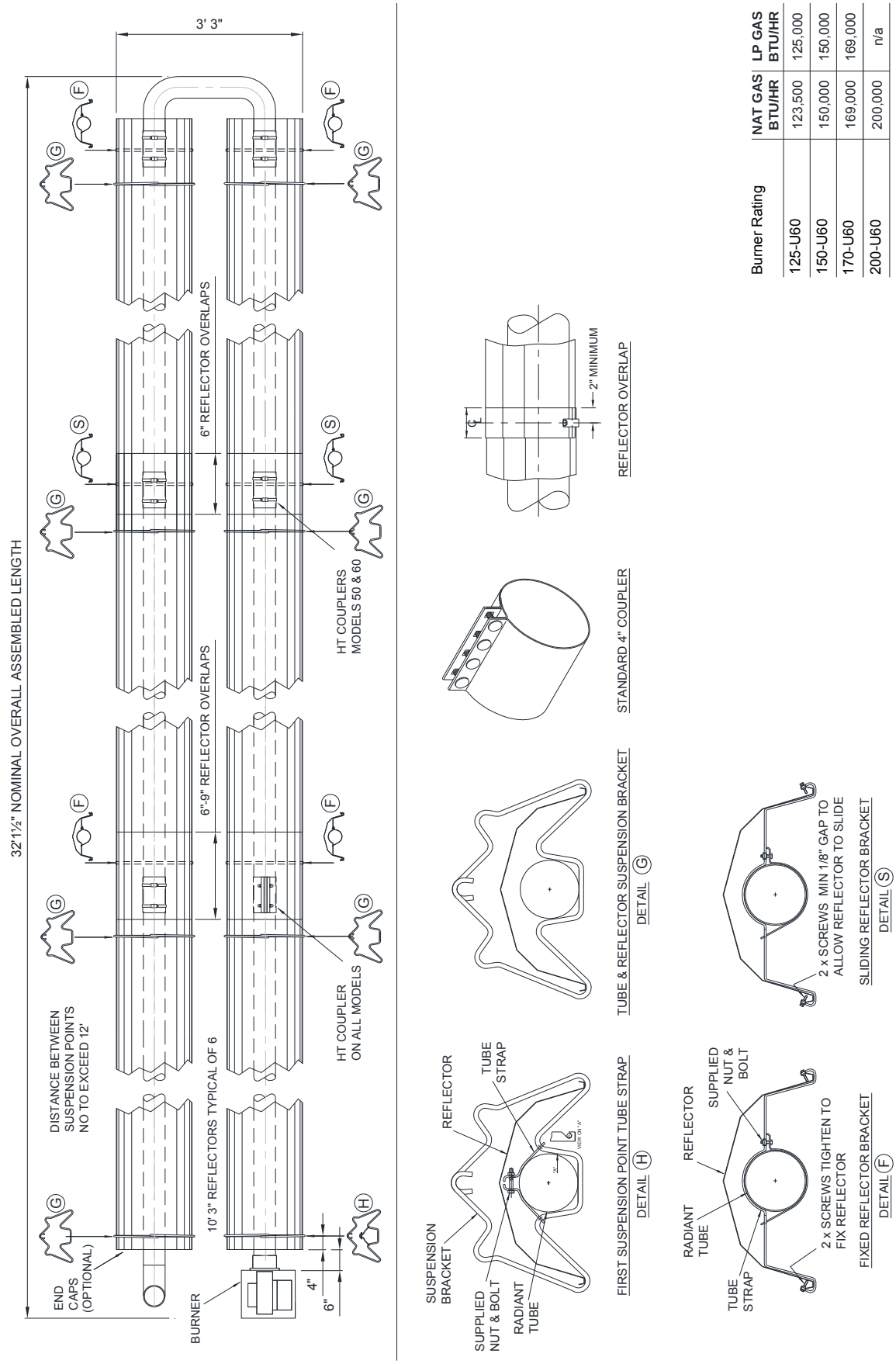
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
60-U20	60,000	60,000
80-U60	80,000	80,000

Figure 17. Heater Assembly: Model U tube 60-U40, 80-U40, 100-U40, 125-U40 and 150-U40.


22'1½" NOMINAL OVERALL ASSEMBLED LENGTH
3' 3"
6"-9" REFLECTOR OVERLAPS
10' 3" REFLECTORS TYPICAL OF 4
DISTANCE BETWEEN SUSPENSION POINTS NO TO EXCEED 12'
END CAPS (OPTIONAL)
BURNER
TUBE ORIFICE SEE DETAIL
BURNER INSERT SEE DETAIL
HT COUPLERS 38 & 45
4"
6"
SUSPENSION BRACKET
SUPPLIED NUT & BOLT
RADIANT TUBE
REFLECTOR
TUBE STRAP
FIRST SUSPENSION POINT TUBE STRAP DETAIL (H)
TUBE & REFLECTOR SUSPENSION BRACKET DETAIL (G)
STANDARD 4" COUPLER
2" MINIMUM
REFLECTOR OVERLAP
BURNER INSERT DETAIL PT. NO. 270489
NOTE: FOR MODELS 25/30 NAT GAS ONLY
2 x SCREWS TIGHTEN TO FIX REFLECTOR
FIXED REFLECTOR BRACKET DETAIL (F)
2 x SCREWS MIN 1/8" GAP TO ALLOW REFLECTOR TO SLIDE
SLIDING REFLECTOR BRACKET DETAIL (S)

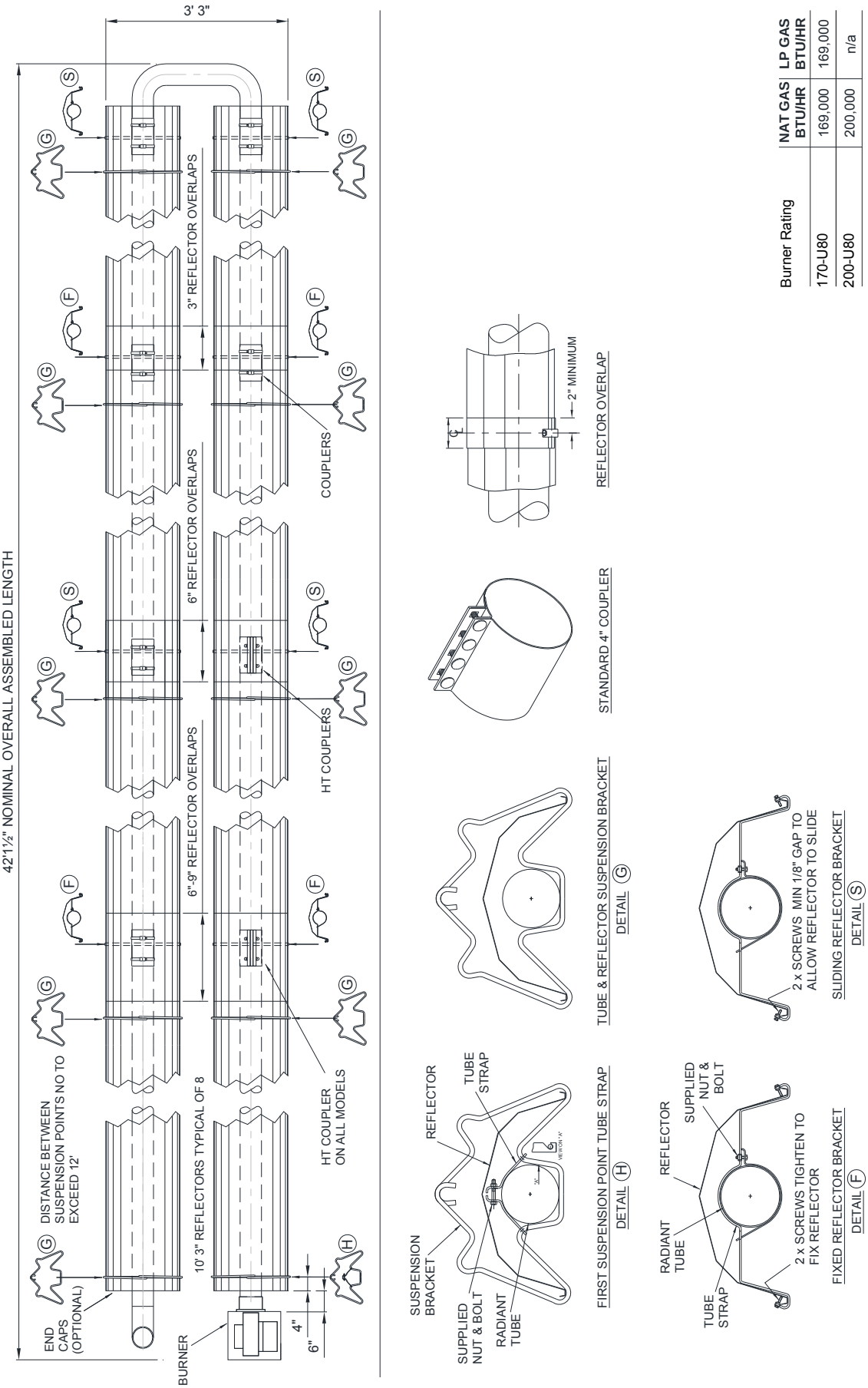
Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
60-U40	60,000	60,000
80-U40	80,000	80,000
100-U40	100,000	100,000
125-U40	123,500	125,000
150-U40	150,000	150,000

Figure 18. Heater Assembly: Model U tube 125-U60, 150-U60, 170-U60 and 200-U60



Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
125-U60	123,500	125,000
150-U60	150,000	150,000
170-U60	169,000	169,000
200-U60	200,000	n/a

Figure 19. Heater Assembly: Model U tube 170-U80 and 200-U80



Burner Rating	NAT GAS BTU/HR	LP GAS BTU/HR
170-U80	169,000	169,000
200-U80	200,000	n/a

3. Start Up Instructions.

These appliances should be commissioned by a qualified mechanical contractor.

3.1 Tools Required.

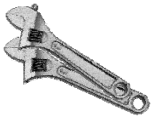
The following tools and equipment are advisable to complete the tasks laid out in this manual.

Suitable alternative tools may be used.

Leather Faced Gloves

Phillips Screwdriver

Small Flat Head Screwdriver



Large Adjustable Wrenches for fitting Of Gas Flex.

½" Wrench

5/32" (4mm) Allen Wrench

Manometer

Multimeter

3.2 Start Up procedure

Inspect installation and ensure that it has been carried out in accordance with these instructions. Remove burner and inspect the electrode assemblies ensuring these are securely fixed and all electrical connections securely made.

Re-fit the burner ensuring that it is correctly positioned and the screws are fully tightened. Ensure that electrical and gas supplies are isolated.

The gas supply should be purged and tested for soundness in accordance with local and National Safety codes.

Open isolating gas valve and test gas connections for soundness using soap solution.

Open the control housing door by unscrewing the securing screw. Ensure all internal components are securely fixed and all connections securely made.

Open the manual gas valve outside the control housing

Switch on the electrical supply to start the heater and observe the correct start up sequence. Ensure that the setting of any time switch and thermostat are such that the heating system will be required to operate.

The fan will start to run and the 'power on' lamp will illuminate. Safe-start checks are carried out automatically.

After the fan has run up to full speed and a satisfactory pressure condition has been established, the ignition sequence will commence. The spark ignition will be energized producing a spark at the ignition electrode. The gas solenoid valve will at the same time be energized and the 'burner on' lamp will illuminate. If the ignition is successful, the flame is detected by the flame sensing probe and the 'burner on' lamp will remain on.

If ignition is unsuccessful the gas valve will close and the spark ignition de-energized after approximately 15 seconds.

For approximately 30 seconds the fan will purge the system then re-ignition will be attempted. After 2 further attempts at ignition the control unit will 'lock-out', the 'power on' lamp will remain illuminated and the fan will run for 120 seconds and then stop.

To reset after 'lockout' switch off the power supply to the system and wait 2 minutes. Then turn the power on. If repeated 'lockout' occurs, investigate the cause.

Set burner gas pressure as follows:
Switch off the power supply to the heating system.

Connect a 'U' tube manometer to the pressure test point provided on the combination gas control valve.

Remove the cover from the pressure regulator revealing the adjustable screw.

Start the heater and using a suitable screwdriver adjust the pressure regulator, turning the screw clockwise to increase the pressure or counter-clockwise to decrease the pressure.

Set the pressure to appropriate inches w.c. from the table of gas pressures and orifice plate dimensions for correct heater description.

Switch off the power supply to the heating system. Disconnect ‘U’ tube manometer, then secure screw in pressure test nipple.

Check the operation of the flame safeguard equipment as follows:

With the heater running normally, switch off the gas supply at the shut off valve. The heater should attempt to relight. If the gas valve has been left off, ‘lock-out’ should occur. This is indicated by the ‘power on’ lamp being illuminated and fan running, but the ‘burner on’ lamp being off.

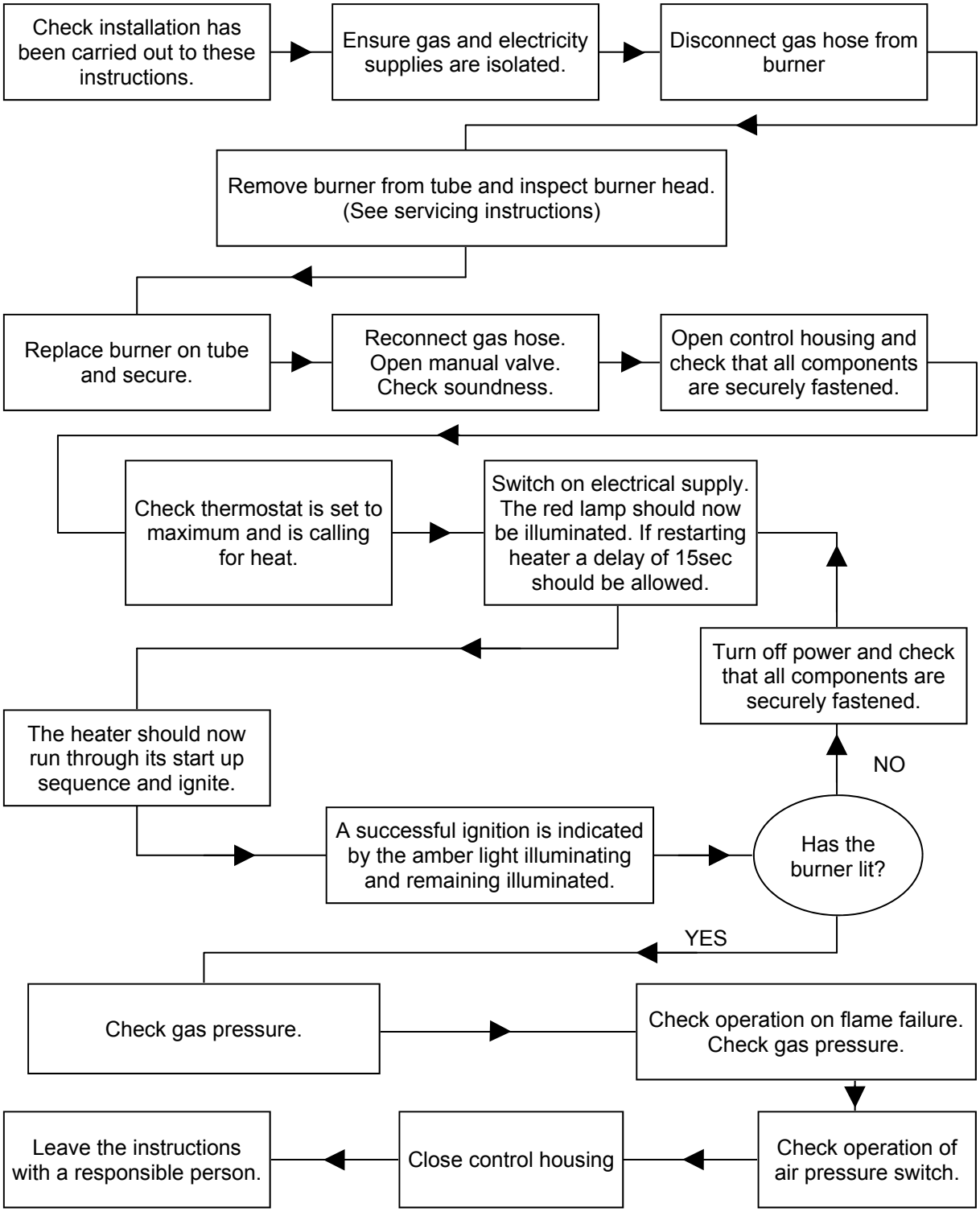
Check the operation of the pressure proving switch as follows:

With the heater running normally, pull off the silicone rubber tube connecting the vacuum switch to the combustion chamber. Within 4 seconds the burner should shut off.

Then replace the tube securely and observe that the heater proceeds to ignite in the normal way.

Close the controls door securing it with the screw.

Commissioning chart


Check installation has been carried out to these instructions.
Ensure gas and electricity supplies are isolated.
Disconnect gas hose from burner
Remove burner from tube and inspect burner head. (See servicing instructions)
Replace burner on tube and secure.
Reconnect gas hose. Open manual valve. Check soundness.
Open control housing and check that all components are securely fastened.
Check thermostat is set to maximum and is calling for heat.
Switch on electrical supply. The red lamp should now be illuminated. If restarting heater a delay of 15sec should be allowed.
Turn off power and check that all components are securely fastened.
The heater should now run through its start up sequence and ignite.
NO
A successful ignition is indicated by the amber light illuminating and remaining illuminated.
Has the burner lit?
YES
Check gas pressure.
Check operation on flame failure. Check gas pressure.
Leave the instructions with a responsible person.
Close control housing
Check operation of air pressure switch.

4. Servicing Instructions.

These appliances should be serviced annually by a competent person to ensure safe and efficient operation. In mildly dusty or polluted conditions more frequent servicing may be required. Servicing work should be carried out by a qualified mechanical contractor.

4.1 Tools Required.

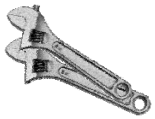
Suitable alternative tools may be used.

The following tools and equipment are advisable to complete the tasks laid out in this manual.

Leather Faced Gloves

Phillips Screwdriver

Small Flat Head Screwdriver



Large Adjustable wrenches for fitting of Gas Flex.

½" Wrench

5/32" (4mm) Allen

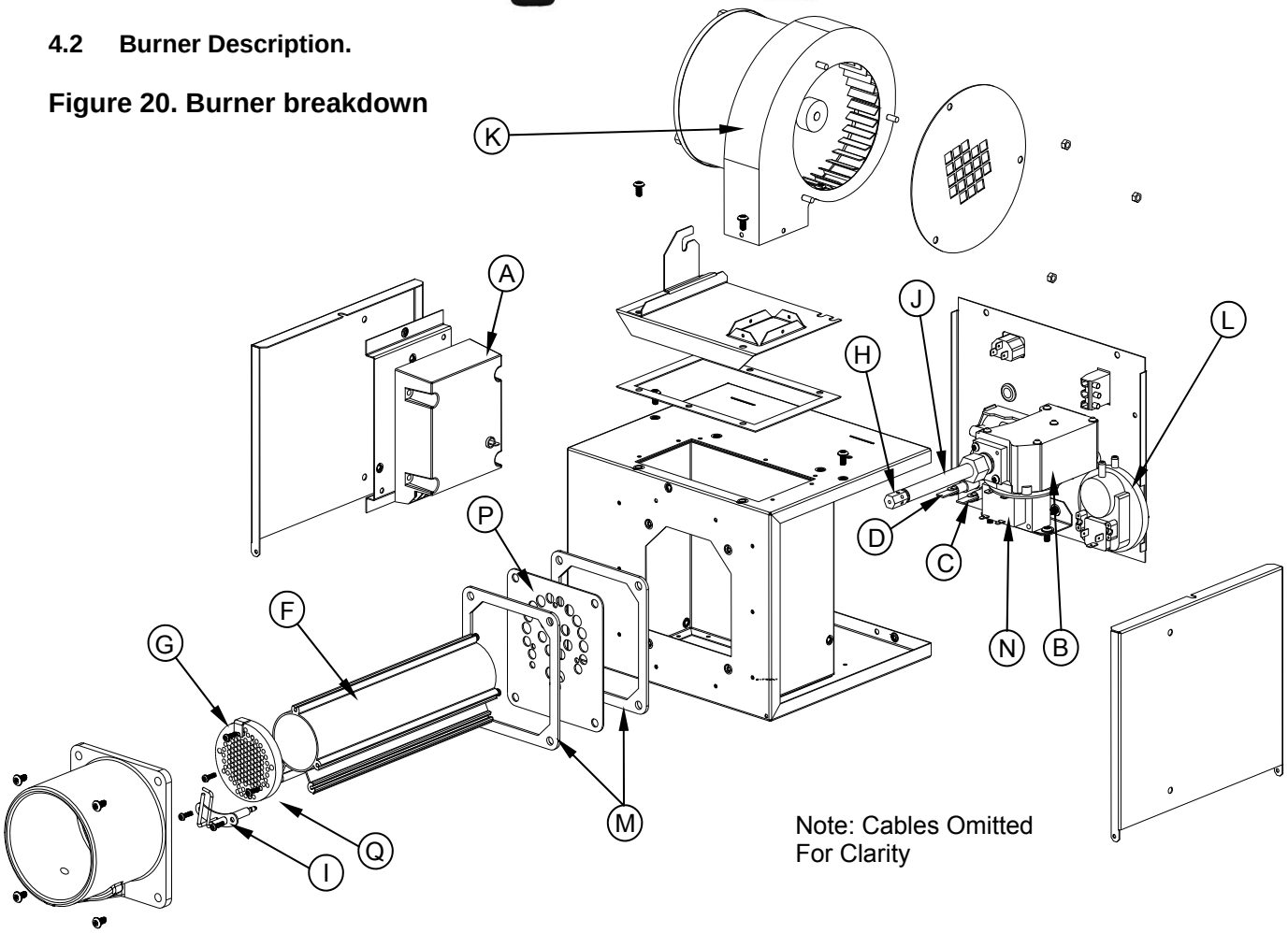
Manometer

Multimeter

Soft Brush

4.2 Burner Description.

Figure 20. Burner breakdown

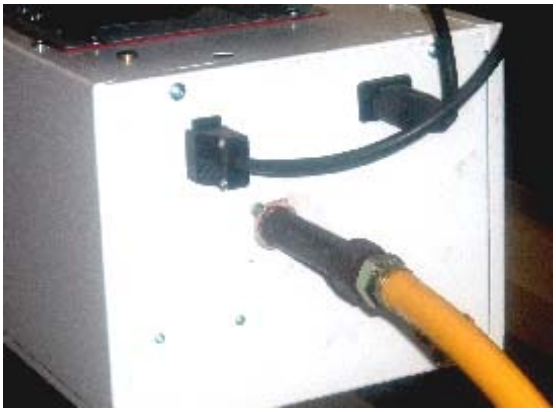


A	Ignition Controller	J	Jet Carrier
B	Gas Valve	K	Combustion Fan
C	Power On Red LED	L	Pressure Switch
D	Burner On Yellow LED	M	Gaskets
F	Burner Tube	N	Transformer
G	Burner head	P	Burner Orifice Plate
H	Injector	Q	Flame Plate (not shown)
I	Igniter Assembly		

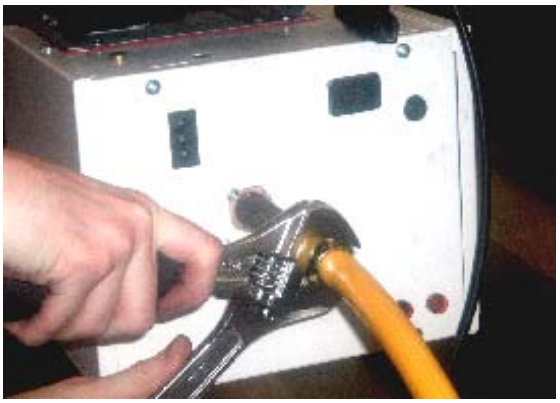
4.3 Burner Removal

Step 1 Isolate power and gas supplies.

Step 2 Unplug the power connectors.



Step 3 Detach the gas supply as shown below, taking care to support the burner connection.



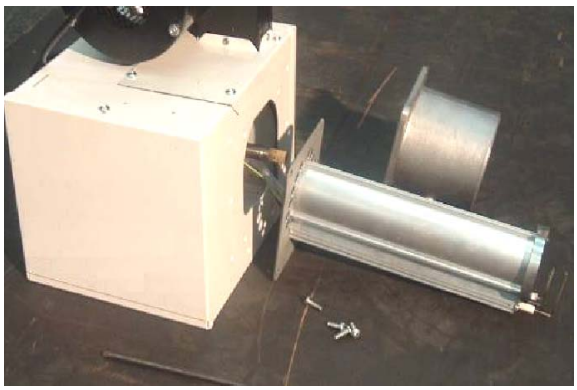
Step 4 If fresh air is connected, slacken hose clip and remove the flexible hose from the burner.

Step 5 loosen the set screw on the burner support casting to enable the burner to be removed from the radiant tube.

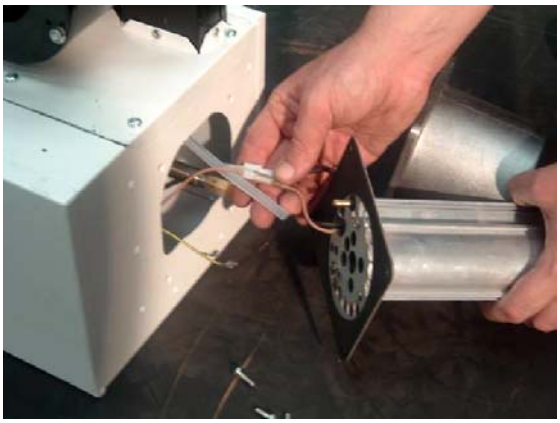
Step 6 Remove the burner and position the burner in a safe area to prevent the burner or components attached to the burner from falling to the ground.

4.4 Burner Gas Injector Servicing

Step 1.a Remove the burner support casting and gasket.

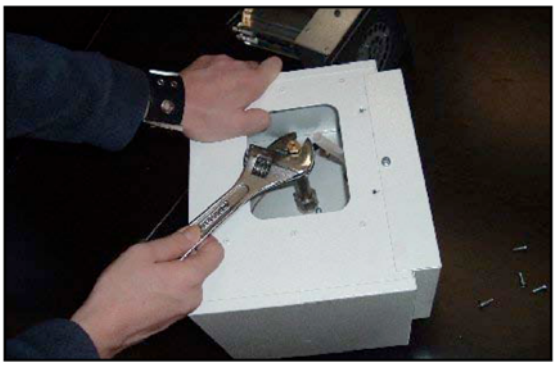


Step 1.b The burner head assembly can be disconnected by separating the connectors of the ignition lead, ground lead assembly and removing the pressure switch silicon tube.



Step 2 The gas injector can be inspected and replaced if contaminated or blocked.

When replacing the gas injector ensure approved thread sealant is used.



Step 3 Reconnect ignition leads, ground lead and silicone tube to test nipple. Refit gasket and support casting.

4.5 Burner Head and Electrode Servicing

Step 1 Check the pepper pot burner head for contamination. If necessary this can be removed. See below. This can be cleaned together with the Inside of the burner head.

Step 2 The pepper pot burner head can be replaced ensuring the 5 holes on the outer ring are aligned alongside the probes.

Step 3 The condition of the igniter assembly can be checked for deterioration. However, we advise replacement at each service to ensure continued reliability. Detach the electrode assembly from the burner head by removing the two screws and separating the igniter lead connectors.

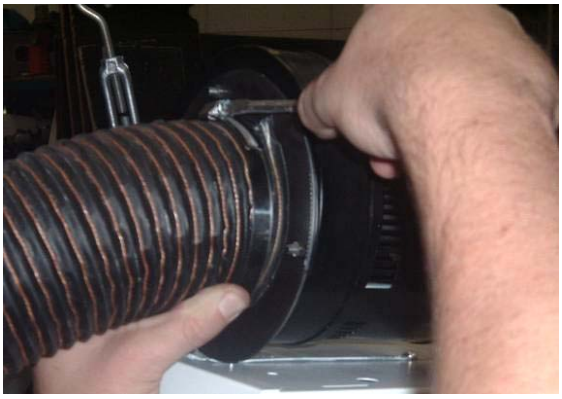
Step 4 Refit the electrode assembly and ensure the connections are secure to prevent incorrect sparking of the spark electrode.

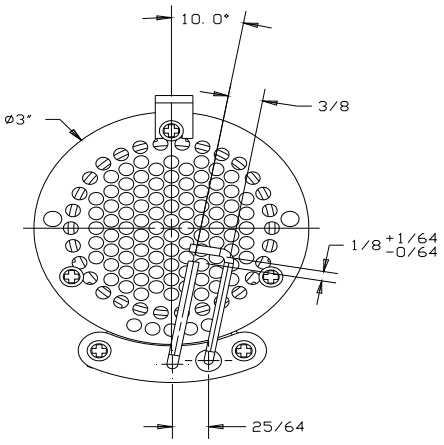
Step 5 Check the positions and spark gap as shown below.

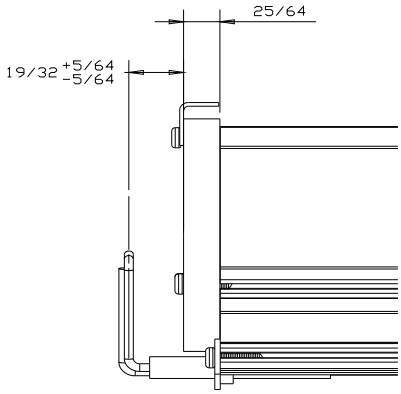
Step 6 The burner assembly is ready to refit after servicing the combustion fan and the radiant tube assembly.

4.6 Combustion Fan Assembly

Step 1 If fresh air is fitted, loosen hose clamp and remove the flexible hose from the fan.

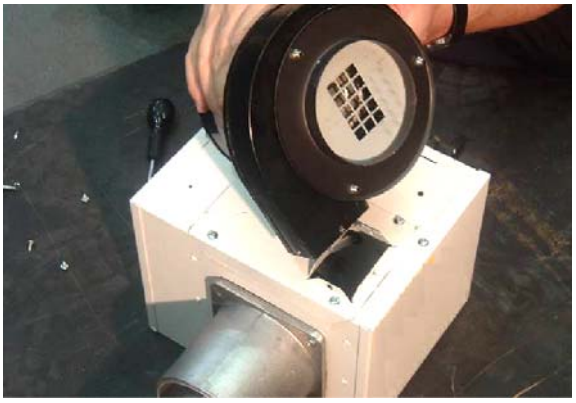






Step 2 Remove fan screws and unplug from burner box.

Step 3 The combustion fan can now be detached.



Step 4 Remove the fan orifice plate and ducted air connection (If fitted)

Step 5 Inspect the impeller and remove any dust with a soft brush.

Step 6 Remove any dust from fan scroll and from around the motor.

Step 7 Ensure the impeller rotates freely.

Step 8 Refit components.

4.7 Radiant Tube Servicing

Step 1 Brush any dust from the exterior of the tubes.

Step 2 Visually inspect inside the tubes. If they appear clean, skip to servicing the reflector.

Step 3 If required the interior of the tubes can then be cleaned using an industrial vacuum cleaner or by using long poles and a scraper.

4.8 Reflector Servicing

The condition of the reflectors should be noted. If necessary the reflectors can be cleaned with a mild detergent. This can significantly improve the efficiency of the appliance.

4.9 Cleaning of Vent

Inspect the fresh air inlet duct and vent to ensure they are free from any blockage or obstruction. The air inlet terminal and vent terminal should be inspected to ensure they are not liable to obstruction.

4.10 Re-commissioning After Service

After servicing of the heater has been undertaken, it will be necessary to re-commission the heater as detailed in Section 3 of these instructions.

5. Spare Parts.

Required Spares

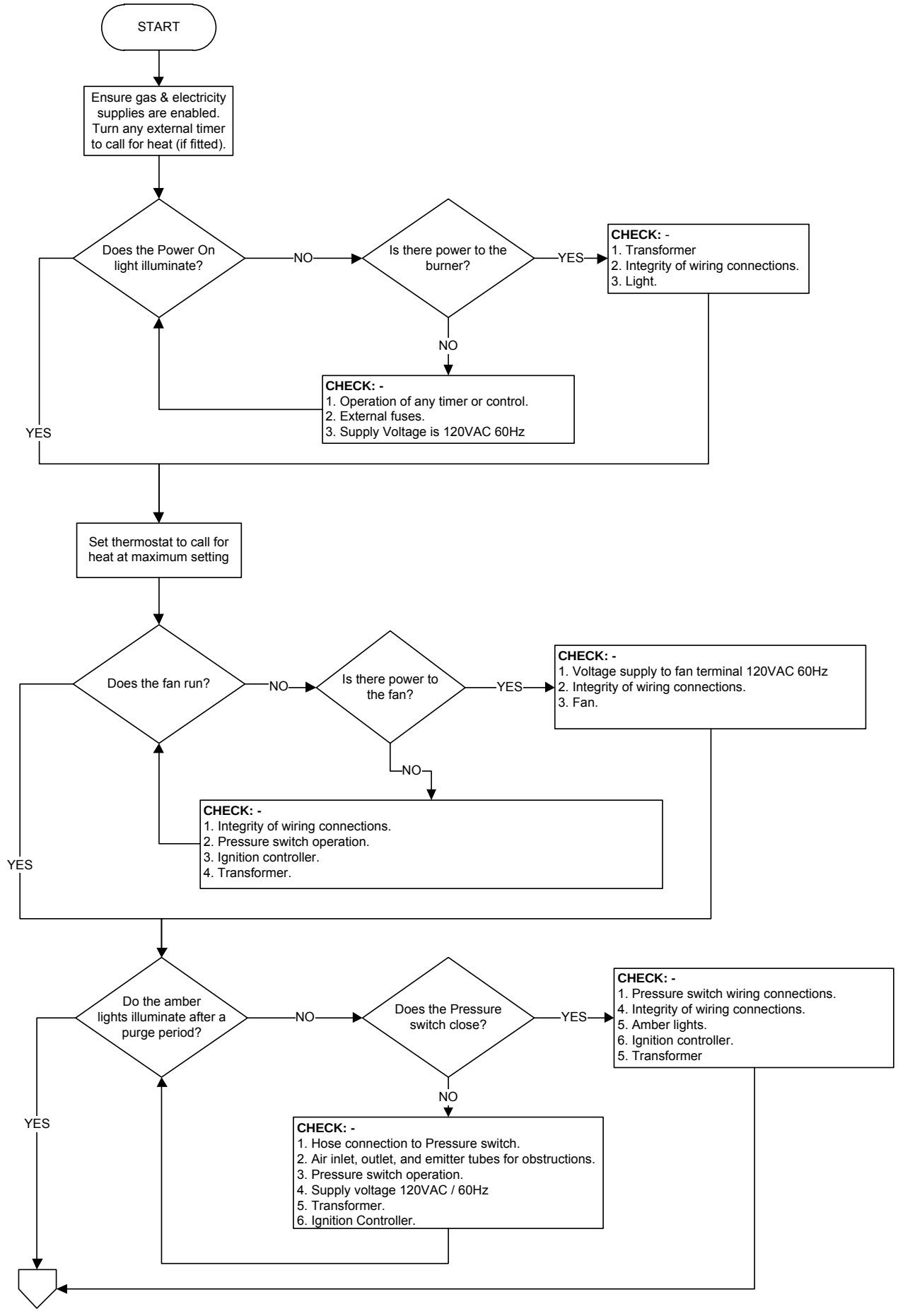
In order to aid troubleshooting and servicing we recommend that the components shown in this section should be stocked.

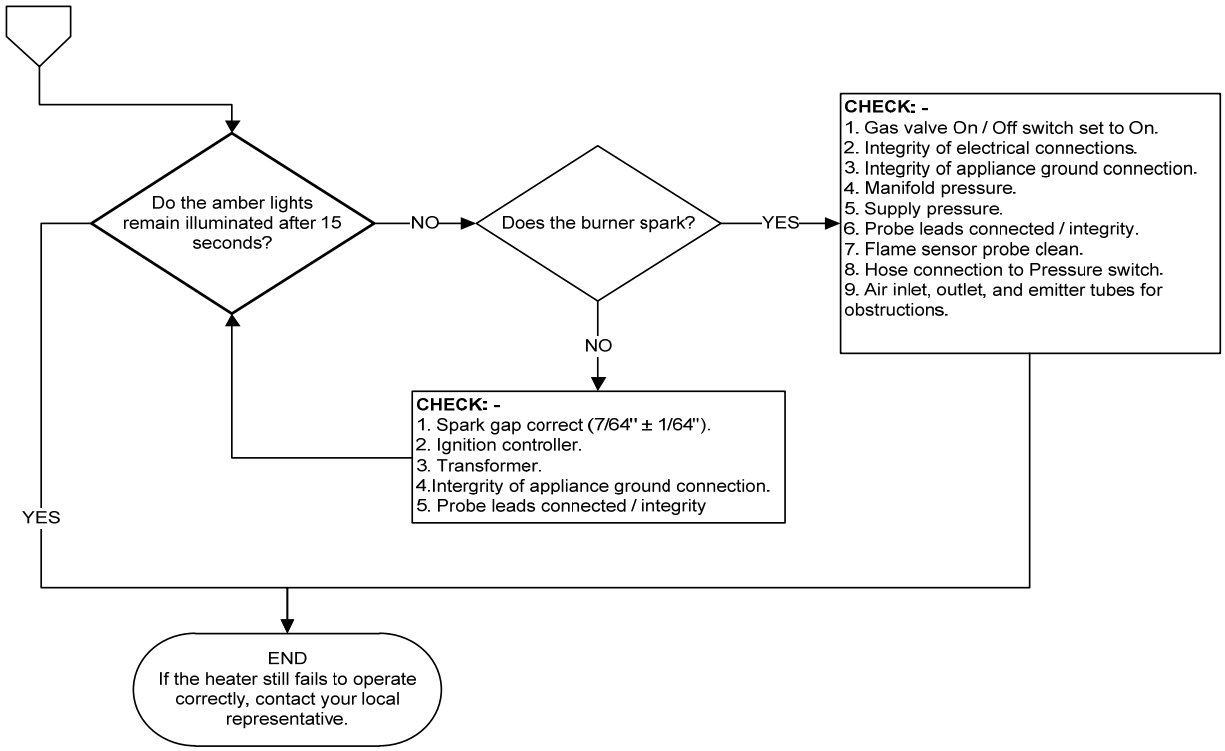
Note: Any spare part components that are not approved by the manufacturer could invalidate the approval of the appliance and the warranty.

Item	Description	Part No.
	Transformer (30VA)	175265
	Gas Valve NG LPG	 270378 270496
	Flame Plates Models 60 NG & LPG 80 / 100 LPG 125 / 150 LPG 170 LPG	 269957 269958 269959 269960
	Jet Carriers Models 60 - 150 NG 60 - 170 LPG Model 170/200 NG	 270375 270376
	Burner Head	270425
	Burner Tube	270424
	Turbulators Models 60 / 80 LPG S20	 270495
	Burner Insert Models 80 / 100 NG	 270489

Item	Description	Part No.
	Pressure Switch Models 60 - 170 Model 200 NG	 270386 270387
	Single Probe Ignitor with Connector Lead	270441
	Amber Neon (Burner On)	270473
	Red Neon (Power On)	270474
	24V UT Ignition Controller	204955
	Injector	See section 1.8
	Combustion Fans Models 60 - 170 NG, 60 - 150 LPG Models 200 NG, 170 LPG	 270464 270467

6. Troubleshooting Guide.




Do the amber lights remain illuminated after 15 seconds?
NO
Does the burner spark?
YES
CHECK: -
1. Gas valve On / Off switch set to On.
2. Integrity of electrical connections.
3. Integrity of appliance ground connection.
4. Manifold pressure.
5. Supply pressure.
6. Probe leads connected / integrity.
7. Flame sensor probe clean.
8. Hose connection to Pressure switch.
9. Air inlet, outlet, and emitter tubes for obstructions.
NO
CHECK: -
1. Spark gap correct (7/64" ± 1/64").
2. Ignition controller.
3. Transformer.
4.Intergrity of appliance ground connection.
5. Probe leads connected / integrity
YES
END
If the heater still fails to operate correctly, contact your local representative.

To aid in the trouble shooting process the UT controller has a LED flash code diagnostic sequence:

Steady Off	No control Power
Steady On	Power Applied, Control OK
1 Flash	Combustion Pressure Switch Open With Blower On
2 Flash	Combustion Pressure Switch Closed With Blower Off
3 Flash	Lockout From The Three Ignition Trials
4 Flash	Lockout From Five Flame Losses
5 Flash	Control Hardware Fault Detected
6 Flash	Lockout From Five Pressure Switch Losses

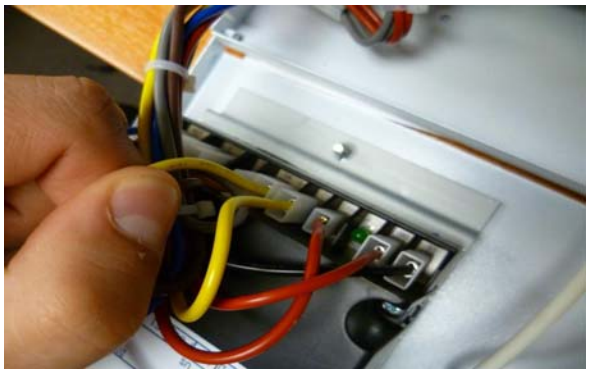
7. Replacing Parts.

Turn off gas and any electrical supplies to the heater before starting repair work.

7.1 Burner Controller Replacement

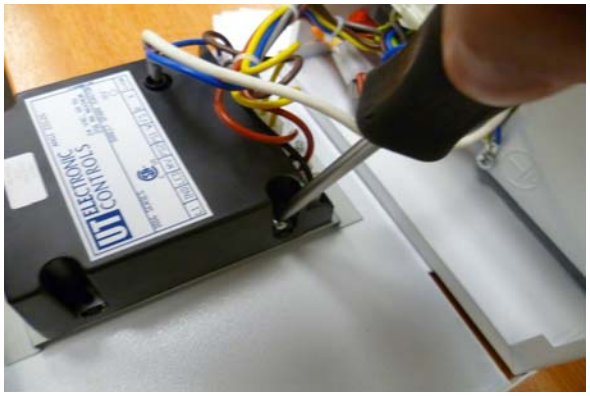
Step 1 Loosen screw in burner lid and open the right hand burner access door.

Step 2 Disconnect burner controller from the wiring harness.



Step 3 Disconnect the Spark Lead from burner controller.

Step 4 Remove the two screws attaching the controller to the burner and remove.



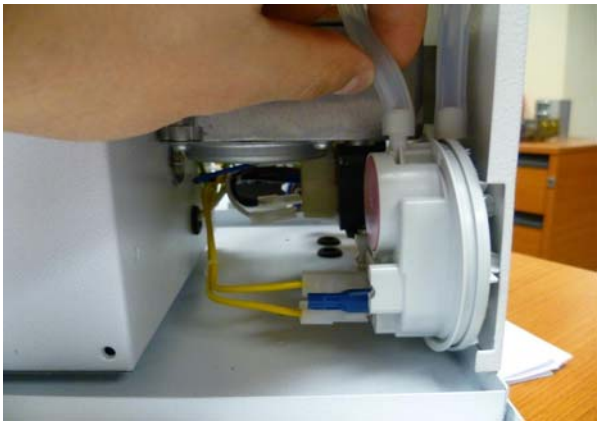
Step 5 Attach new burner controller

Step 6 Reattach leads

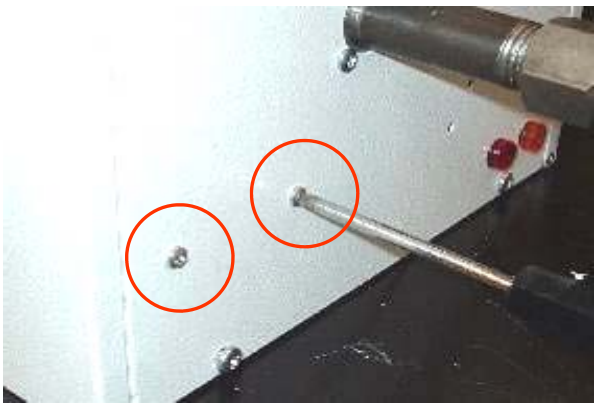
Step 7 Test product and close access door.

7.2 Air Pressure Switch Replacement

Step 1 Open left hand door. Disconnect the two silicone tubes from the pressure switch.



Step 2 Remove the two screws as shown below.



Step 3 Remove electrical connections. The air pressure switch can now be removed.

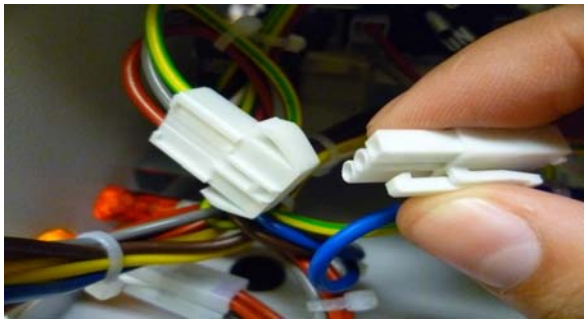
Step 4 Fit the new air pressure switch ensuring the silicon tubes are connected as shown below.

Step 5 Test product and close access doors.

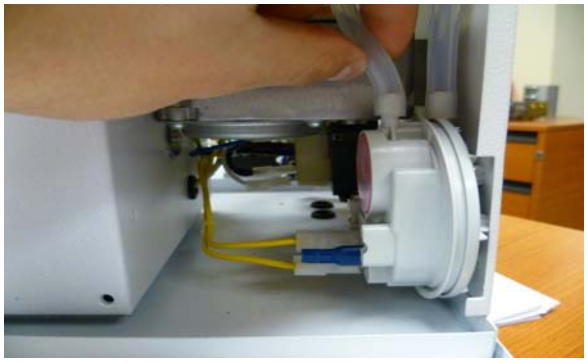
7.3 Gas Valve Replacement

Step 1 Remove the burner assembly as described in the Servicing Sections.

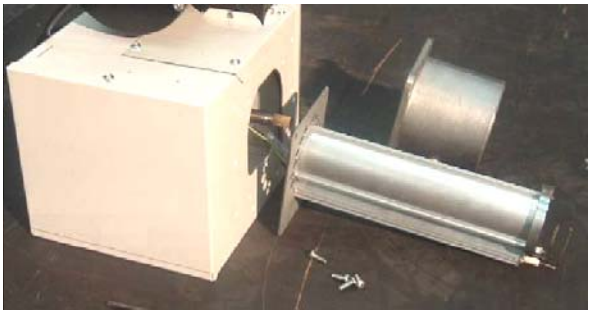
Step 2 Open the right hand access door and detach the burner controller from the wiring harness.



Step 3 Open the left hand access door and detach the silicon hoses from the air pressure switch.

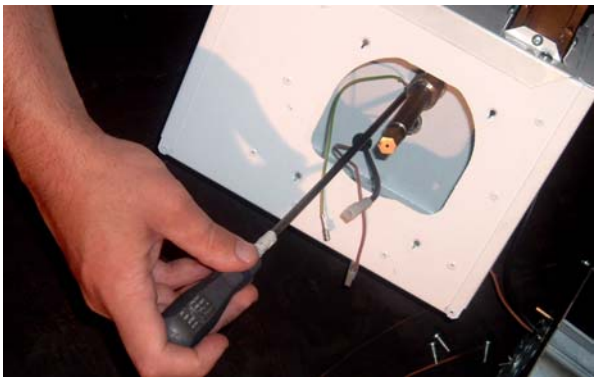


Step 4 Remove the 4 screws holding the burner head onto the burner assembly.



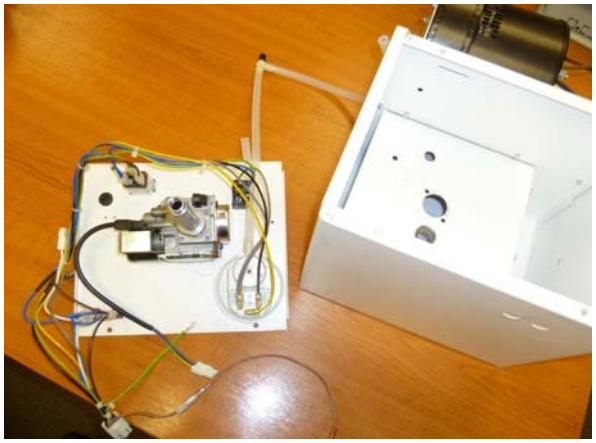
Step 5 The burner head can now be detached by disconnecting the silicon tube and the burner head wiring.

Step 6 Detach the two screws holding the front of the gas valve.



Step 7 Remove the four screws holding the rear burner plate in position.

Step 8 Remove the rear plate.



Step 9 The jet carrier, gas inlet, and wiring harness can now be detached from the gas valve.

Step 10 The two screws retaining the gas valve can then be removed.

Step 11 The gas valve can now be replaced.

Step 12 Reattach all components.

Step 13 Set pressures and ensure reliable burner performance.

BURNER Rating.	Natural Gas Altitude Conversion Kit	Propane Gas & Propane Altitude Conversion Kit	Combustion Air inlet Kit	Aluminized Steel End Cap Kit (1Pair)	90° Elbow Kit (1 Off)	180° U-Bend Kit
60	270630	270619	270613	270611	270277	270276
80	270630	270620				
100	270631	270621				
125	270632	270622				
150	270633	270623				
170	270634	270627*				
200	270635	270628**				

* Burner de-rated when converted to propane
** Burner de-rated when converted to propane. Not for use at altitude.

Notes.

Notes.

8. User & Operating Instructions

Radiant tubular infrared heaters are designed for overhead heating of industrial and commercial buildings. Individual heating units are suspended from the roof.

1. This appliance must only be installed by qualified installer in accordance with the requirements of local and National Codes.

2. This appliance must be grounded in accordance with the National Electrical Code ANSI/NFPA No.70 or Canadian Codes.

3. Never rest anything, especially ladders against the heaters.

8.1 To Start the Heater

1. First ensure that the gas supply to each heater is turned on by opening the main gas shut off valve.

2. Ensure that the setting of any time switch and thermostat are such that the heating system will be required to operate.

3. Switch off the electricity supply to the heater. The fan will start, the 'power on' light on the burner will illuminate and ignition commence.

4. Ignition will occur.

5. If ignition is successful the gas valve will close and the spark ignition de-energize after approximately 15 seconds. For approximately 30 seconds the fan will purge the system then re-ignition will be attempted. After 3 attempts at ignition the control unit will 'lock-out', the 'power on' lamp will remain illuminated and the fan will continue to run. To reset after 'lockout', switch off the power supply to the heater and wait 5 minutes. Then turn the power on. If repeated 'lockout' occurs investigate the cause.

8.2. To Switch Off Heater

1. Switch off electrical supply to the heater. The burner will stop and the fan will shut off.

8.3. Servicing

1. To ensure continued, efficient and safe operation it is recommended that the heater be serviced regularly by a qualified person every year in normal working environments but in exceptionally dusty or polluted environments more frequent servicing may be needed.

Your Local Representative

Thomas&Betts

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Memphis, TN 38125,
United States
Phone: 901-252-5000